ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 4.] [1908.

XXI.—NOTES ON SOME TRANSVAAL TREES AND SHRUBS.

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Since the publication of my preliminary account of the native trees of the Transvaal, in the *Transvaal Agricultural Journal* (Vol. V., No. 18, January, 1907), I have been able to compare some of my material with types and authentically named specimens in the Kew herbarium. I wish to express my thanks to the Director and to the members of the Kew staff for their courtesy and assistance in many ways, and especially for their valuable suggestions as to the possible relationship of specimens of which neither flowers nor fruit were available for identification.

I have also been able to examine some of Warburg's types of *Ficus* and named material of Rehmann's collections at Zurich, through the kindness of Dr. Schinz, and have incorporated my Zurich notes with those from Kew. Where Zurich specimens are cited, the fact is noted.

Through the courtesy of the gentlemen in charge, I was able also to examine some South African material in the herbaria of Boissier and of Delessert, at Geneva.

Finally, when passing through Cape Town, on my return to South Africa, I spent a day with Dr. Bolus verifying citations of specimens in his herbarium, and making a few additional comparisons. I wish to take this opportunity of thanking him for the great assistance he has rendered me on this and other occasions.

As it was necessary to make as many comparisons as possible in the very limited time at my disposal at Kew, it was not feasible to give much attention to the dissection of flowers. Where close critical work was required, as in the case of the *Rubiaceae*, *Ebenaceae*, and *Celastraceae*, I have had to content myself for the present with approximate determinations only, reserving closer study for a more favourable opportunity. As it is uncertain when

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I may again be at Kew, it seems desirable to place on record the data already obtained, as a working basis for further investigations in the field and herbarium. If it is clearly understood that the determinations in the case of these critical families are but approximate, it is not likely that they will prove misleading.

The nomenclature of families and genera here followed, is that of De Dalla Torre and Harms in the *Genera Siphonogamarum*. To avoid confusion between their sequence and that of Bentham and Hooker as followed in the Kew herbarium, I have compromised by arranging the families and genera alphabetically, which though not scientific, has the advantage of simplicity and facility of reference.

Twelve genera and seventy-nine species have been added to the original list, while thirteen specific names have been dropped as being synonyms, or for other reasons. The corrected totals at present stand : 57 families, 144 genera, 335 species. When more is known about them, a number of these species will almost certainly be found not to attain the minimum height of ten feet, here taken as the lower limit of a "tree." This is the case in the genera *Rhus*, *Gymnosporia*, *Plectronia* (and some other *Rubiaceae*), *Royena*, and perhaps occasionally also in *Combretum* and *Acacia*. In working through these genera it was found desirable to deal with all the Transvaal species of the genus, and to place the information so gained on record. Moreover, our knowledge of these genera is so incomplete that we are constantly finding that species which are shrubs in one zone, become trees in another.

While comparing my own material with that at Kew it has seemed desirable to place on record some of the determinations arrived at. But in many cases I have not had sufficient material to furnish duplicates for Kew. It does not always follow therefore, that when my own collections are cited, they are also represented in the Kew Herbarium.

The spelling of place names and of Dutch words has been copied from the original labels of the collections, and though not always correct, it has been thought best not to alter it here, for fear of misinterpreting a record.

I.—GYMNOSPERMAE.

TAXACEAE.

In the revision of the *Taxaceae* in *Das Pflanzenreich*, Pilger places the two forms of the common or Regte Geelhout, which we have been calling *Podocarpus Thunbergii* and var. *falcata*, in two distinct sections of the genus, *i.e.*, *Eu-podocarpus* having a thickened receptacle, and *Stachycarpus*, in which the receptacle shows no apparent development. According to this view Thunberg and Robert Brown were right in considering these to be distinct species, and the names given by Brown should stand, as follows :—

Podocarpus (Eupodocarpus) latifolius, (*Thunb.*) *R. Br.* ; (syn. *P. Thunbergii*, Hook.).—Houtboschberg forests (Patatabosch), *Davy*, 5114 ; Drakensberg forests, Lydenburg District, *Legat.*

Podocarpus (Stachycarpus) falcatus, (*Thunb.*) *R. Br.*; (syn. *P. Thunbergii* var. *falcata*, (Thunb.) Sim.—Drakensberg forests, Lydenburg District, *Legat.*

II.—ANGIOSPERMAE.

LILIACEAE.

Aloe Marlothii, *Berger*; "Kopaarse."—Smits Drift Valley, Haenertsburg, plentiful along the eastern slopes of hot, dry hills, 4,000 ft. alt., Jan. 1906, associated with *Euphorbia Reinhardtii*. This is the arborescent species placed tentatively under the name *Aloe* (*ferox*, Mill. ?) in my list. There are good specimens in the garden of the late Sir Thomas Hanbury, F.L.S., at La Mortola.

Dracaena sp.—A slender-stemmed species of *Dracaena*, six to ten feet high, occurs in the "bush" on Modjanjies Mt., in the Zoutpansberg. Specimens suitable for identification have not yet been procured.

MUSACEAE.

Musa ventricosa, *Welw.*—The Wild Banana of the Transvaal has been identified from seeds sent by me to Kew, as belonging to this species. This is a handsome plant, well worthy of cultivation in sub-tropical gardens where *M. Ensete* is now grown; the red midribs contrast beautifully with the bright green foliage. It is remarkable that our only known species of *Musa* should be also indigenous to Angola, when there are two species of the Lower Zambesi basin (*M. livingstoniana*, Kirk, and *M. Buchanani*, Baker) which do not appear to extend so far south. An apparent relationship between our northern flora and that of Angola is noticeable in other families of trees. This relationship appears to be closer than that between the floras of the Northern Transvaal and Nyasaland, but this may be only apparent and due to the fact that so little is yet known about the latter flora, while Welwitsch's extensive collections in Angola make us fairly familiar with the plants of that region.

ANACARDIACEAE.

Harpephyllum caffrum, *Bernh.*; "Kaffir plum."—Barberton, Reimer's Creek, 3,000–3,555 ft., a large tree, common, *Davy*, 5199. My specimens have neither flowers nor fruit, but the foliage exactly matches that of Natal specimens; there is no Transvaal material at Kew, and this appears to be the first record of its occurrence in the Colony.

Protorhus longifolia, (*Bernh.*) *Engl.*—My specimens from the Barberton District agree well with one so named, collected by Dr. Bolus near Delagoa Bay. In both the leaves are mucronate, whereas in other specimens at Kew they are very obtuse.

Rhus acutidens, *Engl.*—Houtbosch, *Rehmann*, 5558 in herb. Zurich.

Rhus coriacea, *Engl.*—A manuscript note by Mr. N. E. Brown on a Kew sheet of *R. burkeana*, Sond., indicates that *R. coriacea*

is synonymous; comparison with the Berlin type is necessary to settle this point. Pretoria, *Rehmann*, 4745; Boschveld, Klippan, *Rehmann*, 5329, both in herb. Zurich.

Rhus (discolor, *E. Mey.* ?).—Near Lydenburg Stadt, Dec. 1894, *Wilms*, 250; "Hoggeveld bei Bronkhorstspruit," *Rehmann*, 6575, both in herb. Zurich.

Rhus discolor var. *β* **paucinervis**, *Engl.*—Hoggeveld, Page's Hotel, *Rehmann*, 85 in herb. Zurich.

Rhus divaricata var. *β* **fulvescens**, *Engl.*—Hoggeveld, Trigardsfontein (Near Bethal), *Rehmann*, 6705 in herb. Zurich.

Rhus glaucovirens, *Engl.* in *DC. Monogr. Phanerog.* v. 4, p. 432.—A manuscript note by Mr. N. E. Brown on a Kew sheet of *R. Zeyheri*, Sond., indicates that these are synonymous.

Rhus laevigata, *L.*—Houtboschberg, borders of woods, Patatabosch, *Davy*, 5180.

Rhus lancea, *L.*—Two distinct trees are passing under this name: (1) the common Karee-boom of our south-western districts, which I have distinguished as *R. viminalis*, Vahl.; and (2) a broader-leaved species which I have designated as *R. lancea*, L. Both occur in the same region, but appear to me quite distinct, and I have not found intermediate forms. I have not seen the types, and therefore am not able to state which of the two should be called *R. lancea*; until this point is cleared up it will be best to retain the names adopted in my published list, as follows:—

R. lancea, *L.*—The form with lanceolate leaflets and less drooping habit. Wonderboom farm, near Pretoria, alt. about 4,100 ft., *Davy*, 2281; Waterberg district; Pruizen, near Potgieter, occasional at foot of hills, *Davy*, 5200; Smits Drift Valley, Haenertsburg, *Davy*.

R. viminalis, *Vahl.*—The true Karee-boom, with drooping branchlets and willow-like, linear-lanceolate leaflets. Common, Vaal Kiver, "large timber-tree; Boer name Crie-wood," *Nelson*, 23; Blaauwberg, Zoutpansberg, "Mutoto," "Karee," *F. C. Menne;* Wonderboom farm, near Pretoria, *Davy*, 2280; Warm Baths, Waterberg District, 3,600 ft. alt., *Davy*, 2211; Smits Drift Valley, near Haenertsburg, *Davy*. Most of the Kew material from the Karroo, Orange River Colony, &c., which is referred to *R. lancea*, belongs to this form.

APOCYNACEAE.

Rauwolfia caffra, *Sond.* in *Linnaea* v. 23, p. 77.—Magaliesberg, southern slopes, *Zeyher*, 1183 (type); Magaliesberg, "Fls. Octo. and Nov." *Burke*, 113; ("fruit obcord. with two pyr. or obliqu. ellips. with 1 pyr. (by abort.); sec. nerves up to 30 on each side") note on Burke's sheet Crocodile River, November, *Burke* (young fruit); Barberton, river bank, Avoca, tree 40 ft., fls. Sept.–Oct. 1890, *Galpin*, 1061. Extends northward to Nyasaland and the Congo Free State.

Rauwolfia natalensis, *Sond.*—Natal, common tree 33–40 ft. "bark used as Cinchona" *J. H. Bowker*, in herb. Kew. The leaves of this specimen somewhat resemble those of a small *Anthocleista*; it is possible that the former has been mistaken for the latter which is used as Quinine by the Zoutpansberg natives. A specimen from the Zoutpansberg collected by Mr. C. E. Legat (T. D. A. herb. 129) may be this species, but the material is inadequate; the leaves are longer and broader, and the berries larger, than in any specimen of *R. caffra* at Kew. The foliage of this specimen simulates that of *Adina Galpini*, the "um-Thlomu," or "River Matome," for which it is sometimes mistaken.

ARALIACEAE.

Cussonia Gerrardi, *Seem.* (*See Hook. Icon. Pl.* t. 1454; syn. *Panax Gerrardi*, Harv. *Gen.* ed. 2, p. 147).—*Rehmann*, 6485, from the Houtbosch may be this, but the Kew specimen is incomplete.

Cussonia natalensis, *Sond.*—My specimens from Potgieter, Waterberg District, and Smits Drift Valley, Zoutpansberg District, agree well with Natal material at Kew.

Cussonia paniculata, *Eckl. & Zeyh.*—A specimen collected by Burke at "Rhenosterkop near Beaufort," is very like the glaucous-leaved cabbage-wood (species "A" of my list) so common on dry kopjies throughout the Transvaal high veld, but there were no Transvaal specimens at Kew for comparison.

Cussonia spicata, *Thunb.*—Near Lydenburg, *Wilms*, 546. It occurs also in Tropical Africa as a "tree 18 ft. high." Perhaps the species "B" of my list.

Cussonia umbellifera, *Sond.*—Barberton, *Galpin*, 395 "tree 20 to 40 ft."; Houtboschberg forests, common, called "Ma-Tchaytch," *Davy*, 5182.

BURSERACEAE.

Commiphora africana, (*Berg.*) *Engl.*—Kalahari, *Schinz*, in herb. Zurich. This appears to agree with a specimen collected (in leaf and fruit only) near Potgieter, in the Waterberg District, and sometimes found in the hedges planted round Kaffir kraals in the central Zoutpansberg. The bark flakes off as in *Platanus*.

Commiphora (**molle**, *Engl.?*).—Barberton, dry hillsides, Crocodile-poort, 1,600 ft., Sept. 1890, *Galpin*, 1077, "fls. small, brown." This needs comparison with the type at Berlin.

Commiphora Rehmanni, *Engl.*—Klippan, Bush-veld, *Rehmann*, 5324.

CAPPARIDACEAE.

Maerua angolensis, *DC.* (Oliver in *Fl. Trop. Afr.* v. 1, p. 86).—Smits Drift Valley, Zoutpansberg, granite outcrops, about 4,200 ft. alt., Jan. 10, 1906, *Davy*, 5197; near Potgieter, Waterberg District, *Davy*; Crocodile River Valley, near Barberton, alt. 2,000 ft., Sep. 1890, *Galpin*, 1066, "fls. white"; between Delagoa Bay and

Lebombo Mts., alt. 100 ft., Aug. 1886, *Bolus*, 7642. There are specimens at Kew from the Transvaal; Natal; Zambesia; Abyssinia; Senegal; Nigeria ("small tree 10 ft., stamens pale yellow, calyx green. Often planted on graves." *Barter* in herb. Kew) and the White Nile ("small tree, very brittle wood").

Maerua caffra, (*Burch.*) *Pax*; (syn. *Niebuhria triphylla*, Wendl.).—Lydenburg, "Kloof bei Stephanus Schoeman's farm," *Wilms*, 30; Groenkloof, Pretoria, alt. 4,500 ft., fruiting November, *Davy*, 3206; Aapjies-poort, Pretoria, *Rehmann*, 4237; Crocodile River, *Burke;* Swaziland, Havelock Concession, 3,000 ft., "tree 20 ft." *E. Saltmarshe*, ex herb. Galpin, 1065; Pretoria "in clivis collium 4,200 ft, cir. Tree about 15 ft." *J. H. McLea*, ex herb. Bolus, 5585.

CELASTRACEAE.

The South African genera and species of this family need thorough revision in the light of recent collections.

Catha edulis, *Forsk.*—Mac-a-Mac Falls, 4,300 ft. alt., *Davy*, 5201; Spelonken, "Wild tea," *F. C. Menne;* Spelonken, *H. A. Baily* ("Spelonken tea"); our specimens compare well with Abyssinian specimens from A. de Franqueville, and with Uganda specimens at Kew; the leaves are extremely variable in outline and dentation. Uganda, 5,000–6,000 ft. "small tree; leaves are chewed by natives of British East Africa and Somaliland; said to have great sustaining powers enabling to go without food. I think called 'Yart' by Somalis," *Lord Kesteven*, in herb. Kew.

Elaeodendron aethiopicum, (*Thunb.*) *Oliv.* var. **pubescens**, *Oliv.* in *Fl. Trop. Afr.* v. 1, p. 365; (syn. *Mystroxylon burkeanum*, Sond. in *Fl. Cap.* v. 1, p. 470, teste Oliver, l.c.).—Crocodile River, Nov, *Burke*, 378 (type, in herb. Kew); Pretoria, *Miss Leendertz*, 634; Aapjiespoort, *Rehmann*, 4100.

Elaeodendron confertiflorum, (*Tul.*) var. **leptocarpum**, (*Sond.*) *Szyszyl.*; (syn. *Mystroxylon confertiflorus*, Tul. var. *leptocarpum*, Sond., *Fl. Cap.* v. 1, p. 469.—"Small tree. Fruit edible" *H. Hutton* in herb. Kew; tree 15–20 ft. or much branched shrub, (*Fl. Cap.*); Houtbosch, *Rehmann*, 6459 in herb. Kew and herb. Bolus.

Elaeodendron Rehmanni, *Szyszyl.* — Pretoria, Aapjiespoort, *Rehmann*, 4099 (co-type in herb. Kew). Leaves ovate, very obtuse at base, shallowly dentate.

Gymnosporia acuminata, (*L.*) *Szyszyl.*; (syn. *Celastrus acuminatus*, Linn.).—Swaziland, woods Pigg's Peak, 4000 ft., shrub 8 ft., Mch. 1891, *Galpin*, 1335; Louw's Creek near Barberton, hillside at2,000 ft., alt., April 1890 (fls.); tree 15 ft., *Galpin*, 890, in herb. Kew; some one has marked this sheet "cfr. *Celastrus undatus*, Thunb.," but it does not have the aspect of that species. Ivy Range, Moodies, Barberton, tree, fls. white, *Thorncroft*, 345; Houtbosch, *Rehmann*, 6511 and 6517.

Gymnosporia sp.; (syn. *Celastrus angularis*, Sond.).—"Transvaal," *Dr. Sutherland.*

Gymnosporia botsabelensis, *Loesener* in *Bull. Herb. Boiss.* v. 4. p. 429 (1896).—"Transvaal." No specimen at Kew.

Gymnosporia buxifolia, (*L.*), *Szyszyl.* var.—Near Pretoria, Dec. 1883, *Wilms*, 219; Pretoria, Aapjiespoort, *Rehmann*, 4082; Matebe Valley, *Holub*; Shilouvane, "taillis, shrub 1–2 m. Sept. 1899," *Junod*, 579. At Kew the above have all been placed under *Celastrus buxifolius*, var. *empleurifolius*, (E. & Z.), Sond.

Gymnosporia condensata, *Sprague*.—Small tree, Oliphants River, Nov. 1905, *F. H. Hurley*, No. 1 (type),

Gymnosporia deflexa, *Sprague*; "Transvaal Saffraan."—Woodbush, Oct. 1905 (in flower), *A. P. Grenfell*, 4 (T. D. A. herb. 1142, type); Houtboschberg, Patatabosch, near stream, Jan. 5 (fruit), 1906, alt. 4,750 ft., *Davy*, 5077. A large tree with yellow inner bark and at one time mistaken for *Elaeodendron croceum*, the Cape Saffraan, which has not yet been recorded from the Transvaal.

Gymnosporia fasciculata, *Loesener*.—No Transvaal specimens at Kew. Reported from Barberton.

Gymnosporia heterophylla, (*Eckl. & Zeyh.*) *Loesener*.—Near Lydenburg Town, Sept. 1885, *Wilms*, 222.

Gymnosporia nemorosa, (*E. & Z.*) *Szyszyl.*; (syn. *Celastrus nemorosus*, E. & Z.).—Between Delagoa Bay and Pretoria, in fruit Aug. to Sept. 1886, *Bolus*, 7698.

Gymnosporia polyacantha, (*Sond.*) *Szyszyl.*; (syn. *Celastrus polyacanthus*, Sond.).—Pretoria, Aapjiespoort, *Rehmann*, 4080; Nylstroom River, "shrub in thick bush," *Nelson*, 107.

Gymnosporia tenuispina, (*Sond.*) *Szyszyl.*; (syn. *Celastrus tenuispinus*, Sond.).—Magaliesberg, in flower Dec., *Burke*, 120 (type in herb. Kew).

Gymnosporia luteola, (*Delile*) *Szyszyl.*?; (syn. *Celastrus luteolus*, Delile).—Houtbosch, *Rehmann*, 6518; at Kew this sheet has been placed with *G. undata*, (Thunb.) Szyszyl., and I supposed it was that species, not recollecting that Szyszylowicz had placed it under the tropical African species *G. luteola*.

Gymnosporia Zeyheri, (*Sond.*) *Szyszyl.*; (syn. *Celastrus Zeyheri*, Sond.).—"Beim Grossen Wasserfall bei der Stadt Lydenburg," Aug. 1890, *Wilms*, 225; this has been so named at Kew.

Gymnosporia, sp. nov. (near *G. acuminata*, but leaves usually quite entire).—Houtboschberg, Patatabosch, near stream at 4,750 ft. alt., *Davy*, 5117 (T. D. A. herb. No. 1197); Sabie-hoek Forest, Lydenburg Dist., 4,100 ft., *Davy*, 5208 (T. D. A. herb. 1544a) and *Davy*, 5290 (T. D. A. herb. 1524); Pilgrim's Rest, Van der Merwe Bush, interior of forest, *Davy*, 5203 (T. D. A. herb. No. 1433).

Gymnosporia sp.?—Houtboschberg, Hoek-van-hel-bosch, alt. about 5,000 ft., Jan. 7, 1906, *Davy*, 5156 (T. D. A. herb. No. 1236).

Pterocelastrus Galpinii, *Loesener* in *Bull. Herb. Boiss.*, v. 4, p. 431.—Barberton, amongst shrubs on hillsides in shaded ravines, Reimers Creek, alt. 3,000 ft., "shrub 10 ft., in flower Aug. 1887," *Galpin*, 448 (type in herb. Kew).

Pterocelastrus, sp. nov. ?—Houtbosch, *Rehmann*, 6055.

COMBRETACEAE.

Combretum Kraussii, *Hochst.*—Barberton, Reimer's Creek and Makwongwa Forest, 3,000 ft. alt., tree 15 ft. or more, Feb. 1890, in fruit, *Galpin*, 796, in herb. Bolus.

EBENACEAE.

Diospyros mespiliformis, *Hochst.*—Crocodilepoort, near Barberton, alt. 2,000 ft., tree 20 ft., in flower Oct. 1891, *H. Pauling*, ex herb. Galpin, 1354; Mathibis Kom inter Lourenco Marques et Komatie River Drift, Aug. 1886, arbor 40–50 pedalis, *Bolus*, 7847; Leydsdorp, Thabina, near Tzaneen and Komatiepoort, *Davy*. Common in the Eastern middle veld of the Zoutpansberg, between 2,000–2,500 ft. alt., a conspicuously large tree with dark foliage, usually occurring on ant-heaps in grey soil. Fruit eaten by Kaffirs.

Euclea divinorum, *Hiern.*—Crocodile River, near Louws Creek, 1,400 ft. alt., Sept. 1886, *Bolus*, 1311.

Euclea Guerkei, *Hiern.*—Farm, Rustplaats, near Lydenburg, Nov. 1886, *Wilms*, 916 (type, in herb. Kew).

Euclea lanceolata, *E. Mey.*—Magaliesberg, Nov., *Burke*, 379; *Zeyher*, 1123; near Middelburg, Dec. 1883, *Wilms*, 218; Pretoria, Aapjiespoort, *Rehmann*, 4210, 4216, 4214; Boschveld, Minaars Farm, *Rehmann*, 4857; Shilouvane, Sept. 1889 (?), shrub 1–2 m., *Junod*, 641 A; Wonderboom Farm, alt. about 4,100 ft., Aug. 6, 1904, *Davy*, 2284.

Euclea macrophylla, *E. Mey* (var. ?).—Barberton, Kaap Valley, 2,000 ft. alt., March 1891, "tree 15 ft.", *Galpin*, 1329.

Euclea natalensis, *A. DC.*—Barberton, hillsides among rocks, 2,200 ft., shrub 4–6 ft., fls. Aug.-Sept. 1889, *Galpin*, 484.

Euclea ovata, *Burch.*—Houtbosch, *Rehmann*, 6053.

Euclea undulata, *Thunb.*—Zoutpansberg, "on the redsand flats to the west of Blaauwberg and Hangklip Mountains, south of the Limpopo River, Nov. 4, 1871." "Tolangoola (Tslangoola ?) or Jwarry-Bush, sweet well tasted berry," *T. Baines*.

Royena ambigua, *Vent.*—Pretoria, Wonderboompoort, *Rehmann*, 4527.

Royena cordata, *E. Mey.*—There is no Transvaal material at Kew, McLea's Pretoria specimen so cited by Hiern appears to be *R. Wilmsii*, Gurke, judging by *Wilms*, 923, cited by Hiern; but dissections were not made.

Royena Galpinii, *Hiern.*—Barberton, grassy plains and hillsides, 2,800–4,000 ft., fls. creamy white, Oct.–Nov. 1889, *Galpin*, 603 (type in herb. Kew). Leaves densely rusty-tomentose beneath, in aspect somewhat resembling *Vangueria infausta* except for the difference in colouring of the pubescence.

Royena hirsuta, *L.*—Watervall Riviere, near Lydenburg, Sept. 1885. *Wilms*, 919; *Rehmann*, 4334, in herb. Kew; Pretoria, colles supra Aapies River, is so labelled by Hiern, but appears to be *R. villosa*, which see.

Royena lucida, *L.*—No Transvaal material at Kew.

Royena nitens, *Hiern.*—Barberton, grassy plains, 2,800 ft., "ripe fruit, oblong, plum colour," shrub 1½–2 ft., fls. Sept.–Oct., 1889, *Galpin*, 568; in monte Sheba, prope Barberton, ca. 3,900 ft., Sept. 1886, *Bolus*, 7842 (fls. "white").

Royena pallens, *Thunb.*—Pretoria, Aapjiespoort, *Rehmann*, 4090, 4091; "Transvaal," *Dr. Emil Holub*, in herb. Kew (received May, 1883); Crocodile River, Nov., *Burke*; Johannesburg, ridges above Jeppe's Town, alt. about 6,000 ft., Sept. 1898, *D. F. Gilfillan*, ex herb. Galpin, 6042; near large waterfall, near Lydenburg, Oct. 1892, *Wilms*, 921; near Barberton, banks of Crocodile River, alt. 1,500 ft., shrub 2½ ft., Sept. 1890, *Galpin*, 1094 (labelled "*R. sericea*, *Burch.*"); Shilouvane, plains, shrub 1–2 m., Sept. 1899, *Junod*, 622; Vaal River at Bloemhof, *Davy* ("Blaauwbosch").

Royena (sp. nov. ?).—My 5204 (immature) from Warmbaths, Jan. 1906, appears to be nearer to *R. usambarensis*, Gurke, than to anything else at Kew, but the leaves of the Kew specimen (*Gurke*, 2162a) are shorter and more abruptly acute, with longer petioles and distinctly hirsute shoots.

Royena villosa, *L.*—No Transvaal material at Kew (unless *Rehmann*, 4334 is this, "Pretoria colles supra Aapies River"); the leaves are more obtuse and broader than in *R. hirsuta*, but smaller than in typical *R. villosa*.

Royena Wilmsii, *Gurke.*—Near Pretoria, Dec. 1883, *Wilms*, 923; "In collibus prope Pretoria," alt. 4,100 ft., Sept., *J. H. McLea*, ex herb. Bolus, 3103, in herb. Kew. In *Flora Capensis* Hiern has called this specimen *R. cordata*, and has so marked the Kew sheet, but it is totally different from that species as recognised by him in other cases. This is the species of the Houtboschberg forests known to us as *R. lucida*, the "Zwaart-bast" of the Cape.

EUPHORBIACEAE.

Antidesma venosum, *E. Mey.*—Avoca near Barberton, *Galpin*, 1249, "shrub 10–15 ft."; this is a form with very obtuse leaves, and the Kew sheet is marked as "= Monteiro, Angola specimens"; Lydenburg District, between Spitzkop and Komatie River, *Wilms*, 206.

Bridelia micrantha, *Baill.*—Rehbokdraai, between Nelspruit and Spitzkop, 3,300 ft. alt., *Davy*, 3205; Zoutpansberg, streamlet

flowing from Pisangkop, "a fine tree, one seed in each berry," *Nelson*, 36; Shilouvane, Colline, tree 3–6 m., *Junod*, 682. This is the "M'Tserrie" of the Zoutpansberg, celebrated for its durable, termite-resistant wood. There are, also, at Kew, specimens from Natal, Inanda, "a small tree"; Lagos, "bark medicinal, called 'Iva,'" *H. Millen*, 104; Gold Coast, a "tree about 50 ft."; Sierra Leone, "common in forest, 'Egira,' the pulp of wood, made by boiling, is used for open sores," *G. F. Scott Elliot*, 1891–92. Specimens referred to *B. Zenkeri*, Pax, appear to resemble it closely.

Bridelia stipularis, *Blume*.—Macaliesberg, May, *Burke*; Makapansberg, Streyd-poort, *Rehmann*, 5393. In the field, and when not in flower or fruit, this may perhaps be overlooked for *Vangueria infausta*, or *Combretum Zeyheri*, on account of the form of its leaves.

Croton gratissimum, *Burch.*—Macaliesberg, *Zeyher*, 1513; Rhenosterpoort, Nylstroom River, *Nelson*, 93; Babiaan's River, Nov., *Burke*; Wonderboompoort, Warm Baths, between Pietersburg and Woodbush Village, &c., *Davy*. One Magaliesberg specimen has leaves less lanceolate, more oblong and obtuse than in the type, but this character is not constant. There are also the following specimens at Kew:—Natal, *Gerrard*, 1460, and Kuruman "in lapidis alt. 1,200 m., Feb. 1886"; *Marloth*, under the name *C. microbotryus*, Pax.

Euphorbia Reinhardtii, *Volkens*.—Smits Drift Valley, Haenertsburg, 4,000 ft. alt., Jan. 1906. Called "Mokaw' de" by Kaffirs, "Melk-boom" by the Dutch. The milky juice is described as "skellum," *i.e.*, injurious.

Excoecaria africana, *Mull. Arg.*—My specimens from Louw's Creek, Barberton, appear to agree well with material from Natal and Zululand, so named at Kew. Near Rustenburg, rocky hillsides, a "tree," *Miss Pegler*, 974, in herb. Bolus. It is also said to occur in the Waterberg. There is at Kew material of what seems to be an undescribed species from Natal.

Phyllanthus sp.—Not uncommon along streams of the eastern middle veld below 2,000 ft. alt., Louw's Creek, Barberton, near Leydsdorp; the Matopos, South Rhodesia. I do not find any *Phyllanthus* at Kew to match this, and it may be something quite different, but flowers and fruit are needed.

Phyllanthus verrucosus, *Thunb.* var.—Barberton, dry hillsides 3,000 ft., "much branched shrub 5–8 ft.", *Galpin*, 686.

FLACOURTIACEAE (Bixaceae of *Flora Capensis*).

Dovyalis sp. (*Aberia Zeyheri*, Sond.)—Crocodile River, fls. Nov., *Burke*, 272; Pretoria, Aapiespoort, *Rehmann*, 4097; Houtbosch, *Rehmann*, 6020.

Gerrardina foliosa, *Oliv.*—Barberton, Saddleback Range, 4,000–5,000 ft., fringing woods at the summit of mountain ravines, fls. Sept., 1889, densely leafy shrub, 3–5 ft., *Galpin*, 473. (The leaves resemble those of a *Myrica*.)

Kiggelaria africana, *L.*—No Transvaal material at Kew. Houtboschberg, one of the most abundant trees in the lower forest (4,250-5,000 ft. alt.), called "um-Pata" and "Spekhout," *Davy*, Jan. 6, 1906. Probably gives its name to the forest now known as the Pata(ta)bosch, near Haenertsburg.

Kiggelaria dregeana, *Turcz.*—No Transvaal material at Kew.

Oncoba spinosa, *Forsk.*—No Transvaal material at Kew. "Tongwan Spelonken," Nov. 16, 1906. Called "Tongwan." The Zulus make snuff-boxes of the seed pods, while the Bavenda string them to ankle bands used at dancing. "Tree grows in the form of and about the size of an orange tree." *F. T. Menne*, 3044, in T. D. A. herb.

Scolopia Ecklonii, (*Arn.*) *Warb*; (syn. *Phoberos Ecklonii*, Arn.)—Houtbosch, Transvaal, *Rehmann*, 6464. Leaves sparingly and irregularly erose dentate, coriaceous, margins revolute.

Scolopia Zeyheri, (*Arn.*) *Warb.*—No Transvaal material at Kew.

Trimeria grandifolia (*Hochst.*) *Warb.*; (syn. *T. alnifolia*, Planch.)—Forbes Reef Bush, Swaziland, at edge of bush, Jan. 1, 1905, *Davy*, 2737. No Transvaal material at Kew,

Trimeria trinervia, *Harv.*—No Transvaal material at Kew.

Xymalos monospora, (*Harv.*) *Baill.* in *Bull. Soc. Linn. Paris.* i. 850 (1887); syn. *Xylosma monospora*, Harv., vide *Ic. Pl.* 2444 s.n. *Xylosma*; *Myroxylon monospora*, Forst.; *Toxicodendron acutifolium*, Benth., in *Journ. Linn. Soc. Bot.* xvii. 214, type in herb. Kew). The lemonwood or Borie.—Houtboschberg, "shrub," *Nelson*, 428. Range: Transvaal, Natal, Kaffraria, Amatola Mts., Orange River Colony, Victoria East, Ruwenzori Uganda (Kalungi woods). Placed in the family *Monimiaceae* at Kew. One of the most abundant trees in the mist-belt forests; the wood being considered poor in quality is seldom cut by woodmen.

HAMAMELIDACEAE.

Trichocladus crinitus, *Pers.*—No Transvaal material at Kew.

Trichocladus grandiflorus, *Oliver*, in *Ic. Pl.* 1480.—Barberton, wooded ravines, Moodies, alt. 3,500–4,000 ft., tree 15–20 ft., fls. white, handsome, Sept. to Oct., 1889, *Galpin*, 553; South Africa ("Berg Plateau"), *C. Mudd* (type in herb., Kew); Moodies, Transvaal, *Mrs. Royston*, ex herb. Medley Wood, 4084; Sabiehoek Forest, *Davy*, 5206; Graskop, near Pilgrim's Rest, upper edge of berg, *Davy*, 5207. Seems to occur most frequently on the borders of the forests; flowers ornamental; a small tree worthy of cultivation. Called "Underbush" or "Onderbosch."

ICACINEAE.

Apodytes dimidiata, *E. Mey.* "White Pear."—Barberton, Bearded Man Mt., tree 15 ft., alt. 4,200 ft., Apr., 1890 (fls.), *Galpin*, 903; Pilgrim's Rest, Van der Merwe Bush, *Davy*, 5208 (alt. 5450–5750 ft.). Natal "local name, Bird's Eye; tree, fruit bright red, black projections," *Nelson*, 21, "very showy."

LAURACEAE.

Cryptocarya (Siebertiana, *Engl.* ?).—A common tree of the mist-belt forests, which I have not yet been able to collect either in flower or fruit, is evidently a *Cryptocarya*. It does not match any South African material at Kew, but the foliage is very like that of Buchwald, 167 and 492 from Usambara, labelled *C. Siebertiana*, Engl., at Kew. Until flowers and fruits of our tree have been compared with the type at Berlin, it will be best to retain this as a tentative name. I have collected it as follows:—Patatabosch, near stream, 4,750 ft. alt., Jan. 5, 1906, *Davy*, 5094 and 5096, approach closely to Buchwald's specimens; Houtboschberg forests, 4,000–5,500 ft. alt., June 11, 1905, *Davy*, 5209; Lydenburg District Van der Merwe bush, 5,400–5,750 ft. alt., Jan. 30, 1906, *Davy*, 5210.

LEGUMINOSAE.

Acacia arabica var. **Kraussiana,** *Benth.*—Macaliesberg, *Burke*, 270; Wonderboom farm, near Pretoria, *Davy*; Potgieter, Leydsdorp, Louw's Creek, *Davy*. Apparently not common, though widely distributed. Yields gum. The typical form of *A. arabica* appears to be confined to north and tropical Africa.

Acacia ataxacantha, *DC.*—Borders of forests, Haenertsburg, Pilgrim's Rest, &c. My specimens agree well with tropical African material; there are no other Transvaal specimens at Kew, and this appears to be the first record of its occurrence in South Africa.

Acacia Burkei, *Benth.* "Aapjies-doorn" (No. 126, species "E" of my list).—Macaliesberg, *Burke*, 126; "tree fls. Oct. and Dec." (type), *Zeyher*, 571, 164–10; Savannah country near Nylstroom and Potgieter, 3,600–4,000 ft. alt., *Davy*; Manganja hills, Zambesia, "fine tree, 30–40 ft. high; wood not hard, but tenacious, used by natives for hoe handles, &c.", *Meller*, 9, in herb. Kew.

Acacia caffra, *Willd.*—Makapansberg, Streydpoort, *Rehmann*, 5516; Pretoria, Wonderboompoort, *Rehmann*, 4603; Houtbosch, *Rehmann*, 6272; Barberton, hillsides, Queen's River Valley, alt. 2,300 ft., Sept. to Oct., 1889, "tree 15 ft.," *Galpin*, 546; all in herb. Zurich; Arcadia, Pretoria, *Davy*, in herb. Kew. There are also at Kew specimens from Natal; Kaffraria; Gross Namaland; Clanwilliam; Kalahari; Hereroland; N'Gamiland (Kwebe, "bush seldom above 8 ft. high, fls. white, bark of branches white, local name 'White Thorn'," *Lugard*, 93; Tamalakane River, "Buffeldoorn Acacia," *Jos. McCabe*, 29). One of the most abundant species on kopjies and talus slopes in the western middle veld; often flowering when merely a bush, sometimes becoming a large tree. It is uncertain whether all the Zurich specimens belong to this species, as it and *A. eriadenia* have there been treated as one.

Acacia Catechu, *Willd.*—Our largest species of Acacia, forming a handsome and striking tree on the river banks of the eastern middle veld between 2,000 and 2,500 ft. alt. Thabina River, common between Thabina and Tzaneen, called "White Thorn,"

June 15, 1906, *Davy*, 5211 (T. D. A. herb., 2636); banks of the Middle Letaba River, between Kelly's store and Frazer's store, tall trees with trunks up to 1½ and 2 ft. diameter, *Davy*, 5212 (T. D. A. herb., 2547).

Acacia delagoensis, *Harms.*—Umbolosi, *Schlechter*, 11718, in herb. Zurich. Probably extends into the low veld of the Transvaal. Apparently near to *A. Burkei*: *Bolus*, 7755, "Crocodile River Drift inter Komatie River Drift et Barberton, Aug., 1886," should be compared with this.

Acacia detinens, *Burch.*—Appears to be exclusively western in distribution. Pniel, Vaal River, *W. Roe*, in herb. Bolus, 2070. The only Transvaal specimens I have seen growing were near the Vaal River, between Christiana and Fourteen Streams, and these only bore a few old legumes; without better material their identity is uncertain. There are specimens so named in herb. Zurich, from Amboland, Gross Namaland, and Hereroland, but none from the Transvaal. *A. Fleckii*, Schinz, of the "Kalahari," appears to be very near to *A. detinens* but more slender; it is possible that our specimens belong to it, but I had none at Zurich for comparison. Burchell's name applies very appropriately to our bush, whatever it may be.

Acacia eriadenia, *Benth.*—Resembles pubescent forms of *A. caffra*, and at Zurich the two have been treated as one. Crocodile River, Nov., *Burke & Zeyher*; (types) Houtbosch, *Rehmann*, 6273, 6274; Woodbush village, in dry, open, scrub country, "resembling *A. caffra*, but spike larger and more dense; Sesutu name 'Molouva,' Jan. 4, 1906," *Davy*, 5133 (T. D. A. herb., 1213); near Lydenburg, *Wilms*, 447; Leydsdorp, *Davy*; farm "Wolverand 383," between Klerksdorp and Wolmaransstad, Feb. 10, 1904, *Davy*, 1534 (locally called "Wacht-'n-bietje").

Acacia erioloba, *E. Mey.* = *A. Giraffae*, Burch.

Acacia ferox, *Benth.* "Hoek-doorn."—Aapjies River and Macaliesberg, Sept. (in fruit), *Burke* (type); "Transvaal," *A. P. Grenfell*, 5; between Koobie and Shaw's Valley, Bechuanaland, *Baines.*

Acacia Gerrardi, *Benth.*—Boschveld between Eland's River and Klippan, *Rehmann*, 5028. No. 125 of my list (near Barberton, 1,000 ft. alt.) belongs here, and also Nos. 124 from the Zoutpansberg District, and 130 from the Springbok Flats and Shilouvane. This is the second of the two species common on vlei lands on the Springbok Flats, Waterberg District (*Davy*, 4073, May 18, 1905). When in fruit it is readily distinguished from *A. spirocarpoides* by the falcate, not twisted pod, and the less flattened crown; it is known as the "Rooi-doorn" or "Rooi-bast," and the wood is considered more durable than that of *A. spirocarpoides*, which is said to be used only for fuel.

Acacia Giraffae, *Burch.* "Kameel-doorn."—Common in the Savannah country of the Waterberg and south-western districts; also common in Bechuanaland, Gross Namaland, and Hereroland. No Transvaal specimens at Kew.

Acacia glandulifera, *Schinz.*—British Central Africa, Kwebe Hills, near Lake Ngami, N'Gamiland, 3,000 ft. alt., *Mrs. E. J. Lugard*, 14, 16, who notes that it is a bush 6 ft. high ; the capitate, yellow flowers were collected Aug. 16, 1897, the fruit Sept. 27, and the leaves Feb. 8, 1898. I have collected it at Potgieter in the Waterberg district (about 4,000 ft.), Leydsdorp in the Zoutpansberg district (2,000 ft.), and near Bremersdorp in Swaziland (2,700 ft.). Though it is thus widely distributed it does not appear to be common with us. I have only found it in bush form, from 4 to 6 ft. high.

Acacia hebeclada, *DC.*—Vaal River, May, *Burke*, 522 ; Aapjies River, *Zeyher*, 569 ; extending to Lake River, N'Gamiland, *Lugard*, in herb. Kew ; Griqualand West ; Gross Namaland ; Hereroland and "Kunene-Zambesi Expedition" (herb. Zurich).

Acacia heteracantha, *Benth* ?). — The type specimen of *A. heteracantha* is barren and very incomplete, but Burchell's label describes it as a "tree of 20 ft., legume like that of *A capensis*" (*i.e.*, *A horrida*, Willd.). I have seen no Transvaal material which can be referred here with certainty.

Acacia horrida, *Willd.* "Zoetdoorn ; Sweet thorn."—Of this, the most common and widely distributed of our Acacias, the only Transvaal material at Kew is *Nelson*, 214, from Bloemhof, an incomplete specimen. This and my own specimens from the dry western and south-western districts agree well with those from Cape Colony, being equally glabrous.

The form met with in moist soils at the foot of kopjies, or near fonteins and streams, around Pretoria and on the high veld, is pubescent on the younger parts, which character appears to be constant ; in no other respect does it seem to differ from the typical form. As a geographical variety I think it is well to give it a distinctive appellation and therefore propose to call it var. *transvaalensis*, Davy, var. nov. The young bark is orange-brown, but becomes almost black in age ; it is remarkably tough, and is often stripped for use as rope or cordage and in basket work ; I have seen the broken leg of a cow deftly and firmly bandaged with it. The spines are as variable in size as those of *A heteracantha ;* some shoots are spineless, others bear spines three to four inches long, and of an ivory whiteness. The flowers are borne in large panicles, are deep yellow and powerfully fragrant, hence the vernacular name.

Acacia lasiopetala, *Oliver* (?).—I have collected what may prove to be this species at the White River Settlement, Barberton District, *Davy*, 5213, and Thabina, Zoutpansberg, *Davy*, 5214. It agrees with *Buchanan*, 32 of 1881, "large tree, fls. white, Shiré Highlands, Zambesia" ; also with his 32 of 1891 and 93 of 1878 from Blantyre, "large tree, fls. white, gum exudes from trunk and branches." In foliage and pubescence it is much like *A. Rehmanniana*, Schinz, but the legumes are large and woody, in shape a little approaching those of *A. hebeclada* but longer, glabrous and shining. The bark is quite different from that of *A. Rehmanniana*, being pale yellow, soft and papery, at length flaking off.

Acacia amboensis, Schinz and *A. Stuhlmanni*, Taub., resemble *A. lasiopetala* and *A. Rehmanniana* in the yellow colour of the hairs, but *A. Stuhlmanni* is patently hirsute and the legumes are densely appressed hirsute.

Acacia natalitia, *E. Mey.*—Komatie River, *Davy* (No. 133, species "M" of my list). Nearly related to *A. horrida*, but apparently a valid species, distinguished by the much narrower leaflets and characteristically pale bark, as compared with the dark-brown, almost black, bark of *A. horrida*. "In fruticet. pr. Mailieus Kep. 2,300 ft., 17/11/94" *R. Schlechter*, 4818, in herb. Zurich.

Acacia pallens, *Rolfe* (*A. nigrescens* var. *pallens*, Benth). The type specimens both of *A. nigrescens* and of var. *pallens* are from Zambesia, and in each case they are very incomplete. Additional material from the Transvaal enables Rolfe to separate the latter as a distinct species to which all our material so far collected, appears to belong. I have incomplete winter specimens from Topsi, Bechuanaland, which may belong to *A. nigrescens*, but it is impossible to say definitely until foliage has been collected from the same locality. This is one of our most important timber trees, and is largely cut for mine props under the name of "Knopjies-doorn" or "um-Kai." The prickles persist for many years on the main trunk and branches, effectually arming the tree, though to what advantage is not evident. The type of "var. *pallens*" is from "opposite Pita, near Senna," Zambesia, April, 1860, *Kirk*, 201, "a tree 30 ft., very hard, heavy wood used for clubs."

Acacia Rehmanniana, *Schinz* (No. 129, species "H" of my list). —The type is *Rehmann*, 5517, from Streudpoort, Makapansberg ; my specimens from Marabastad near Pietersburg, were collected only a few miles from the same locality ; I have also gathered it along the Sand River, beyond Pietersburg. The bark is dark, hard, distinctly and coarsely striate and persistent. The Bulawayo specimen referred to in my list appears to belong here, but the White River tree is probably something else, perhaps *A. lasiopetala*, Oliver.

Acacia robusta, *Burch.*—Macaliesberg, *Burke*, 321. Bushveld between Elands River and Klippan, *Rehmann*, 5025 ; without locality (probably Macaliesberg) *Zeyher*, 562, 165·9 ; Wonderboom farm, Pretoria, *Davy ;* Meintjes Kop, Pretoria, *Davy ;* Crocodile River Drift, near Barberton, *Bolus*, 7756. Often seriously affected by the fungus *Aecidium inornatum*, Kalchbr. The leaves are also subject to the leaf-spot *Uromyces phyllodii*, Cooke and Massee ; I am indebted to my colleague Mr. Pole Evans for the determination of these parasites.

Acacia sambesiaca, *Schinz.*—The Zurich type reminds me of a dwarf shrubby species common in heavy "black turf" soils on the Springbok Flats, Waterberg District, 4096-4097, but there were no specimens for comparison.

Acacia spirocarpa, *Davy* in list, not of Hochst. = *A. spirocarpoides*, Engl.

Mimosa asperata, *Linn.* (No. 132, species "L" of my list).—Farm "Wolverand 383" between Klerksdorp and Wolmaranstad, Feb. 10, 1904, *Davy*, 1535.

Pterocarpus sericeus, *Benth.*—Aapjies River, Oct., *Zeyher*, 351 (type); Kaap River Valley, Barberton, 2,000 ft., "tree 15–20 ft., fls. orange-yellow, sweetly scented, Dec. 1889, fruits Mch," *Galpin*, 730; Duivells Kloof, near Fraser's store, Zoutpansberg, 2,700 ft., a large tree, *Davy*, 5216; Streydpoort, Makapansberg, *Rehmann*, 5523. A common and characteristic tree or shrub in the Eastern middle veld of the Zoutpansberg.

LOGANIACEAE.

Buddleia auriculata, *Benth.*, var. **euryifolia**, *Prain.*—Barberton, *Galpin*, 970, *Thorncroft*, *Davy*; Lydenburg, "in verlassenen Kaffern kraalen," June, 1883, *Wilms*, 1030.

Buddleia Lindleyana, *Fort.* Lydenburg, *Wilms*, 1028.

Buddleia salviaefolia, *Lam.*—Macaliesberg, Sept., *Burke*, 376; Mac-a-Mac goldfields, 1874, *J. H. McLea*, 467; near Spitzkop, Lydenburg, Aug. 1884, *Wilms*, 1027; near Lydenburg Stadt, Aug. 1887, *Wilms*, 1027 (bis); Barberton, *Galpin*.

Chilianthus dysophyllus, *Benth.*—Barberton, Reimer's Creek, 3,200–4,000 ft., "climbing shrub 5–12 ft.," July, 1890, *Galpin*, 971.

Chilianthus oleaceus, *Burch.* (syn. *C. arboreus*, Benth.).—Houtbosch, *Rehmann*, 6009.

Nuxia congesta, *R. Br.*—Barberton, *Galpin*; Woodbush, Oct., 1905, *A. K. Eastwood*, 5, "brittle wood" (becoming glabrescent in age); near Pretoria, Nov. 19, 1901, *J. W. C. Kirk*; Pretoria, 1875, *J. H. McLea*; Pretoria, Kuduspoort, *Rehmann* s.n.

Var. (syn. *N. pubescens*, Sond.).—Barberton, *Thorncroft*, 129; near Mac-a-Mac, 1874, *J. H. McLea*; Macaliesberg, June, *Zeyher*, 1326 ex parte (type), *Burke*, 259.

Var. (syn. *N. tomentosa*, Sond. in *Linnaea*, v. 23, p. 84).—Macaliesberg, June, *Zeyher*, 1326 ex parte (type); Kuduspoort, Pretoria, *Rehmann*.

Var. **brevifolia**, *Sond.* l. c. p. 83.—Macaliesberg, June, *Zeyher*, 1327 (type) = sp. nov.

Nuxia dentata, *R.Br.*—Shilouvane, shrub 6 to 9 ft., "M'Betane" and "Mosetane," *Junod*, 1430; Komatiepoort, 100 ft., *Schlechter*, 11738. (The Kew sheets bear the legend = "*N. oppositifolia*, Benth., and *N. Schlecteri*, Gilg.")

Nuxia floribunda, *Benth.* My specimens match well with typical *N. floribunda*; there is no Transvaal material at Kew.

MELIACEAE.

The African species of this family are badly in need of revision,

Ekebergia capensis, *Sparrm.*—It is doubtful whether we have this species in the Transvaal. My M'babane tree (2909) appears to belong to the next species.

Ekebergia Meyeri, *Presl.* "M'nyama."—Swaziland, hill-slope on road from M'babane to Mile's hot springs, Jan. 1905, *Davy*, 2909. Also at Barberton, Delagoa Bay and in Natal.

Pseudocedrela caudata, *Sprague*; ab congeneribus foliolis caudatis differt.

Arbor circiter 9 m. alta, ramis patulis versus apices pendulis, cortice cinereo, innovationibus tantum ferrugineo-tomentosis. *Cicatrices foliorum* depresso-cordiformes, cicatricibus fasciarum tribus notatae. *Folia* 4–6-juga, 15–20 cm. longa, petiolo pubescente 4–5 cm. longo incluso, petiolulis puberulis 0·8–2·5 cm. longis gracillimis; foliola ovata, basi inaequalia, acutissime caudato-acuminata, 3–5·5 cm. longa, 1·2–2·5 cm. lata, chartacea, utrinque superne manifestius reticulata, subtus nervo medio puberula ceterum glabra, nervis lateralibus utrinque circ. 10. *Capsula* subcylindrica, 14–19 cm. longa, utrinque, leviter angustata, medio 3–4 cm. diametro; valvae medio circiter 2·5 cm. latae, 3 mm. crassae, intus nitidulae, stramineae, extra brunneae, dense lenticellosae praesertim superne; columna sulphurea, acutiangulata haud vel vix ultra semina suprema producta. *Semina* pro loculo 2–6, 7·5–10·5 cm. longa, ala 1·8–2·2 cm. lata apice rotundata, corpore circiter 1·7 cm. lato. *Cotyledones* oblique ellipticae, 1·5–2·2 cm. longae, 1·1–1·4 cm. latae.

Transvaal, Blauwberg, Zoutpansberg, 3,900 ft., *Baily* in T. D. A. herb., 2926. Native name "Muchuss."

Trichilia (capitata, *Klotzsch.* ?).—Our specimens do not match the Kew material of this or any other species, the serration and pubescence of the leaflets being quite distinct; it cannot be identified until flowering and fruiting material is obtained.

Trichilia dregeana, *E. Mey.*, said to be the "Thunder-tree" of Natal. There is no Transvaal material at Kew.

Trichilia emetica, *Vahl.*; "Red Esschenhout; Maawa."—A handsome evergreen shade tree, well worth cultivation in frostless, warm-temperate regions; the seeds have a large, bright-red aril, and yield an oil highly valued by the Zoutpansberg natives. It is often noticeable that the ends of the limbs of large trees are lopped off, said to have been done by the natives when gathering the fruit. Barberton, Oct. 1905, *P. Oranje*; Avoca, near Barberton, 2,000 ft., "tree 30 ft. growing on river banks," Sept. 1890, *Galpin*, 1060. The following notes on extra-Transvaal sheets at Kew are worth record:—Delagoa Day, Sept. 1876, "fine tree—most common. Flowers very abundantly—sweet scented", *J. J. Monteiro*, 39; Shiré River, "a handsome tree. The seeds yield an oil and tallow of value and can be obtained in quantity. It is exported from Inhambane" *Dr. J. Kirk*, 76; Lupata, banks of Zambesi, Dec. 1858, "'Motsakin,' yields oil. The native name 'Mafura' means fat and is applied to many different oil seeds. The oil of this species, under the name of Mafura is said to be shipped

from Inhambane. It is used by natives in cooking. The tree common from the coast to Victoria Falls, along the Zambesi, also on Lake Nyasa and the Rovuma." *Dr. J. Kirk.*

Trichilia pterophylla, *D.C.* (1894), (syn. *T. alata*, N. E. Br. in *Kew Bull.*, 1896, p. 160).—Barberton, eastern slopes of Saddleback Mt. 4,500 ft., Dec. 1890, "a tree 25 ft.", *Galpin*, 1226. Woods, Upper Moodies, Barberton 4,400 ft., Oct. 1890, "a tree 20 ft.", *Galpin*, 1083 ; Sabie-hoek forest, Jan. 27, 1906, *Davy*, 5217.

Turraea sp. Tzaneen, Zoutpansberg, about 2,500 ft. alt. Aug. 1905, *J. B. Pole Evans* (T. D. A. herb. 3982), specimen incomplete.

MORACEAE.

Ficus Burkei, *Miq.*—Macaliesberg, *Burke* (type). My 2652 from the Magaliesberg near the Wonderboom, Dec. 9th, 1904, may be this, but does not match the type well. A specimen from the Woodbush collected by D. E. Hutchins may also belong here; the receptacles appear to be the same, but dissections are needed ; the leaves are not quite like the type. There are no specimens at Kew which exactly match the type.

Ficus capensis, *Thunb.*—I have not seen Thunberg's type, but the Kew specimens from the type region (coast districts of Cape Colony and Natal) have much narrower leaves than our Transvaal specimens. The latter have been called by Warburg *F. capensis* var. *transvaalensis*, on sheets in the Zurich herbarium, but this name does not appear to have been published, and until we know what the type is like it is not certain that it is tenable. As at present understood, the species has a wide range of distribution, some forms extending into North Africa. Our Transvaal variety is common along streams of the eastern middle veld ; Lydenburg, bei Stephanus Schoeman's farm, Oct. 1887, *Wilms*, 1344 ; Houtbosch, *Rehmann*, 6487, 6488, 6489 ; Woodbush, 1903, "the large-fruited fig-tree of the open country near the forest," *D. E. Hutchins ;* Barberton, July, 1906, *Davy*, 3489, 3490. I have also collected it at Nelspruit, Sabie Valley (below Sabie-hoek forest at 4,000 ft. alt.), Tzaneen and near Pietersburg. It is not the "Moo-oo'mo" of the Modjajies, as stated in my list through a misconception of the species.

Ficus caffra, *Miq.*—Macaliesberg, Nov., a "tree", *Burke* (type) ; *Zeyher*, 1548 ; in the Kew herbarium the labels of Zeyher's specimens, 1548 and 1549 have evidently been transposed, the label "1549 *Ficus* (Urostigma) *abutifolium*, Miq." being attached to a specimen of *F. caffra* and "1548 *Urostigma xanthophyllum*, Miq." to *F. soldanella*, Warb. (*i.e. F. abutilifolia*, Miq. ?). Wonderboompoort, *Rehmann*, 4434 ; Lydenburg district, "bei Stephanus Schoeman's farm," Oct. 1887, *Wilms*, 1348 ; Houtbosch *Rehmann*, 6490 ; Zoutpansberg, Sept. 5, 1905, "Edordse", *D. E. Hutchins*, 17 (with very large fruits, 6 lines diameter ; perhaps distinct) ; Blaauwbank, "shrub," *Nelson*, 267. Specimens from the following localities are cited by Warburg :—Lydenburg district, between Spitzkop and Komatie River, *Wilms*, in herb. Zurich ; Wonderboompoort, Kuduspoort ("hugel beim Aapjies River")

and Houtbosch. According to Warburg, typical *F. caffra* is confined to the Transvaal, but there are named varieties in Cape Colony, Natal, and Zambesia.

Var. **longipes**, *Warb.*—*See* note under *F. cordata*, below.

Ficus cordata, *Thunb.*—The Pretoria "Wonderboom" was at one time identified for me at Kew as this species, and I have since called it by that name (see *Transvaal Agricultural Journal* v. 4 n. 13, plates 3, 4 and 5. Oct. 1905). Although I have not been able to see Thunberg's type, his published woodcut of it, and the material so named at Kew, show that *F. cordata* is distinct from any species known to us in the Transvaal. It is largely, if not entirely, a coast region species. Warburg, in his revision of the South African species of *Ficus* ("Die Sudafrikanischen Arten d. Gatt. *Ficus*" in *Beitr. z. Kennt. d. Afrik. Fl.* xviii, in *Mitt. a.d. Bot. Mus. d. Univ. Zurich*, xxvi, published in *Vierteljahrschrift d. Naturf. Gessel. in Zurich*, Jahr. 51, Heft. 1, 1906) does not cite any Transvaal material in his account of this species, and restricts the range of distribution to Cape Colony, Bechuanaland and Hereroland; it is possible that the Bechuanaland and Hereroland trees may prove to be distinct.

Rehmann, 4435c (in herb. Zurich) from the Wonderboompoort, Pretoria, appears to me to be only an exceptionally narrow-leaved shoot of the "Wonderboom" tree, with pedicellate receptacles. At one time Warburg appears to have taken it to be a variety of *F. caffra*, for he has written on the Zurich sheet the manuscript name "*F. caffra* var. *lanceolata*, Warb."; but he finally published it as a variety of the Abyssinian *Ficus salicifolia*, Vahl., calling it var. *australis*, Warb. I have seen only one specimen of *F. salicifolia*, and that not the type, but Rehmann's specimens do not appear to bear more than a mere resemblance to it. No other South African material at Kew, Zurich, or Geneva appears to come anywhere near to *F. salicifolia*, and it seems unlikely that that species should extend its range into South Africa; in any case more material is needed before this point can be decided.

Rehmann, 4435 (in herb. Zurich) from the Wonderboompoort Pretoria, appears to me to be much the same as the "Wonderboom," but I had no specimens of the latter with me at Zurich for comparison. From the numbering and general resemblance it seems quite probable that the two specimens 4435 and 4435c came from the same tree. Warburg has, however, taken them to represent distinct species, and has called 4435 *F. caffra* var. *longipes*, Warb.

Warburg seems to have been misled by the presence or absence of peduncles to the receptacles. He has used this character in his key to separate species otherwise closely related, but it is by no means constant; some of my Wonderboom specimens have both sessile and pedunculate receptacles on the same branchlet.

Several specimens at Kew seem to connect the "Wonderboom" with *Ficus caffra*. Among these is one of Atherstone's, which bears the legend "Wonderboom near Pretoria, diam. 24 ft.—hollowed out by fire, formerly 50 feet high." Atherstone's Transvaal collections were made between Dec. 1873 and Jan. 1874.

The receptacles on herbarium material of typical *F. caffra* are larger and less depressed-globose than those on our sheets of the "Wonderboom," but I have not seen fruiting material of both, collected at the same season, with which to make a fair comparison. The "Wonderboom" forms a tree, whereas I do not recall having ever found *F. caffra* other than as a shrub (often with stout stem) climbing up the nearly vertical faces of rock outcrops on kopjies. Burke notes, however, on his label on the type of *F. caffra* from the "Macalisberg," that it is a tree. As there are no Magaliesberg specimens of Burke and Zeyher's collection with leaves as narrow as our herbarium specimens of the "Wonderboom," one is led to wonder whether their specimens of *F. caffra* may not possibly have come from that tree, or whether the latter is perhaps an undescribed species overlooked by them. It seems strange that, as they collected at the Aapjies River, the Magaliesberg, and the Crocodile River, they should have neglected to gather specimens of a tree as striking as the "Wonderboom" probably was, even 80 years ago. The resemblance to *F. caffra* of Atherstone's specimens of 1873–74 lends some colour to this suggestion, but the point can be settled only by the collection of a good series of fresh material and dissections of the receptacles. I hope to be able to do this next November, that being the month of the year when Burke and Zeyher collected *F. caffra*, and when the receptacles of the "Wonderboom" should be in the same stage of development.

Hutchins, 12, "Evergreen fig, um-Kiwan," from the Zoutpansberg, appears to be another form of the "Wonderboom."

Ficus damarensis, *Engl.* in *Bot. Jahrb.* x. (1886), p. 5.—This is near to *F. trachyphylla*, Fenzl., of N. Africa, and needs careful comparison with tropical African forms now referred to that species. The type of *F. damarensis* is *Marloth*, 1267 "juxta fontein 'Usakos' 800 m.," of which he notes "ad 15 m. alta cortice albo, frutibus esculentus." Engler also refers here *Schinz*, 2056, from Southern Angola. Species "D" No. 179 of my list appears to be this, but I have not seen Engler's type. It is one of our finest species of *Ficus*, and is a common tree in the subtropical Transvaal east of the Drakensberg. I have collected it at Barberton (*Davy*, 3488) and Tzaneen. It is readily known by its characteristic yellow bark and much buttressed trunk. The fruit is large and "edible," though usually so full of insects as to be unfit for food. Gerrard's 1632 from "Natal" appears to belong here. Specimens from Kivie Camp, Blaauwberg, Zoutpansberg (*F. C. Menne*), have the leaves much more coriaceous than those from Barberton, but in all cases under my observation they become unusually brittle in drying.

Ficus Dinteri, *Warb.*—Hereroland (type). My 5218 from the Zoutpansberg appears to belong here.

Ficus Durbanii, *Warb.*—Natal, Oakfort, Umhloti river, *Rehmann*, 7476 (type). Warburg tentatively assigns Rehmann's 4431 and 4437 from the Wonderboompoort to this species, but admits uncertainty as the specimens are sterile. It is possible that they belong to *F. Burkei*, typical material of which does not appear to

have been re-collected since Burke's day. I am not yet quite clear as to the specific points of difference between *F. Burkei*, *F. Galpinii*, *F. Durbanii*, and *F. Schinziana*.

Ficus Galpinii, *Warb.*—Barberton, 10,000 ft., "tree 15–20 ft. high," June to July 1889, *Galpin*, 397 (type); between Spitzkop and Komatie River, Lydenburg District, Aug. 1884, *Wilms*, 1345, fide Warburg.

Ficus natalensis, *Hochst.*—No Transvaal specimens at Kew or Zurich appear to belong here. Warburg notes that Rehmann's 6493 from the Houtbosch may be this, but as it is a sterile specimen he is uncertain of its identity. It seems more likely that it is one of the three species *F. Burkei*, *F. Schinziana*, or *F. Galpinii*, rather than *F. natalensis*, which appears to be more coastal in its range, extending southwards into Cape Colony, but apparently not known to occur in the interior.

Ficus Schinziana, *Warb.*—Houtbosch, *Rehmann*, 6491 (type). Warburg notes that this is related to *F. natalensis* and *F. Dinteri*. This may be No. 175 of my list, which is common in the Houtboschberg forests, often saprophytic on other trees, which it finally smothers.

Ficus soldanella, *Warb.* (No. 177, species "B" of my list).—Macaliesberg, Jan., *Burke*, 273; *Zeyher*, 1549; Kuduspoort, Pretoria, *Rehmann*, 4684 (type). *Zeyher*, 1549 is included by Miquel in his *F. abutilifolium*, of which ours may perhaps be only a geographical variety.

Ficus Sonderi, *Miq.* (1867) (*Sycamorus hirsuta*, Sonder in *Linnaea*, xxiii. (1855), 137; not *Ficus hirsuta* of Vell., nor of Hook., nor of Roxb.; *F. Rehmanni*, Warb. l.c. No. 178, species "C" of my list).—Sonder's type is *Gueinzius*, 415, from "Port Natal," while Warburg's type is *Rehmann*, 6486, from the Houtbosch, Transvaal. Warburg has completely overlooked Miquel's name, perhaps because the *Index Kewensis* erroneously gives the distribution of this species as "Malaya"; examination of Kew material would have cleared up this and other doubtful points about the South African species.

The following belong here:—Transvaal: Houtbosch, *Rehmann*, 6486; Zoutpansberg, *D. E. Hutchins*, 15; Roodepoort, Warm Baths, *Bolus*, 12300; Natal: *Gerrard*, 1577; Intschanga, *Rehmann*, 7900; Inanda, *J. M. Wood*, 1361; Bechuanaland, *Baines*. I have also collected it at Barberton and Nylstroom.

Var. **ovalifolia** (*Warb.*), *Davy*, nom. nov. (*F. Rehmanni* var. *ovalifolia*, Warb.).—Natal, Camperdown, *Rehmann*, 7711 (type).

Var. **villosa** (*Warb.*) *Davy*, nom. nov. (*F. Rehmanni* var. *villosa*, Warb.).—S. Rhodesia, *Marloth* (type); Transvaal, between White River and Nelspruit, among rocks, Jan. 25th, 1906, *Davy*, 5219; Bechuanaland, um-Zingwani Valley and Pelicosi (Makalaka), granite kopjies, "tree 20 ft. high, milky juice", *Baines*.

Ficus sp. nov. (No. 176, species "A" of my list).—Nelspruit, *Davy*. This appears to be undescribed, and is very near to a species collected by Dr. Kirk at Champenga, Zambesia, "the large

tree near the house," but in the latter the leaves are rather broader. I have not compared it with Warburg's illustrations of the Congo species.

Ficus "sp. F." (No. 181 of my list).—My Koomatiepoort specimen was not sent for comparison, but it may match Gerrard's 1631 from Natal or Zululand, which agrees with specimens from "near Merambella," Zambesia, *Kirk*, and "Island in the Shiré below M'bewe, bark smooth, whitish, . . . 15 to 20 ft.", *L. Scott*, which have been referred tentatively to *F. antithetophylla*, Steud. (*F. capraefolia*, Delile.)

MYRTACEAE.

The anomalous genus *Heteropyxis* has now been transferred from *Lythraceae* to *Myrtaceae* (see *Bull. Herb. Boiss.* v. 4, p. 439).

Heteropyxis canescens, *Oliv.* in *Ic. Pl.* v. 25, t. 2407, Nov. 1895 (syn. *H. transvaalensis*, Schinz in *Bull. Herb. Boiss.* v. 4, p. 439, June 1896).—Barberton, Reimer's Creek, 3,000–4,000 ft., Sept. 1889, tree 25 ft., *Galpin*, 518 (type of both of the above names). A small, slender-stemmed, crooked tree with white bark, making it very conspicuous among the other trees and shrubs among which it grows. Foliage drooping, leaves emitting a strong, camphor-like odour when crushed.

Heteropyxis natalensis, *Harv.*—Mountains, Dorum River, Cave Mts., "shrub," *Nelson*, 406; Barberton, Reimer's Creek, 2,800 ft., tree 15 ft., fls. Feb. 1891, *Galpin*, 1295; Shilouvane, Colline, March, shrub 1–3 m., *Junod*, 1423; Vallon du Masetane, 2–4 m., *Junod*, 1090; Botsabelo, Miq., Middelburg District, in saxos pr., 1,630 m., *Schlechter*, 4098; Warm Baths, *Davy*. Also in Nyasaland and Natal.

OLACACEAE.

Ximenia caffra var. **natalensis**, *Sond.*—Barberton, lower hillslopes, 2,000–2,800 ft., fl. Nov. 1889, shrubs 8–10 ft., fruit scarlet, edible, Kaffir name "Matindeluka," *Galpin*, 736. Barberton, Kaap River Valley, 2,000–2,800 ft., shrub 8 ft., fruit plum-colour, edible, *Galpin*, 1105, Sept. 1890. Natal: Kaffir name "um-Tunduluka," *J. M. Wood*, in herb. Kew.

OLEACEAE.

Olea foveolata, *E. Mey.*—Transvaal, Masetane River, near Shilouvane, Zoutpansberg, shrub 2–3 m., *Junod*, 1266. Also in Natal, the Transkei, &c. Leaves broader than in typical *O. laurifolia*.

Olea laurifolia, *Lam.* Black Ironwood.—No Transvaal material at Kew.

Olea (MacKenii, *Harv.?*).—Houtboschberg, Aug. 31st, 1905, *A. P. Grenfell* (T.D.A. herb. 1026); material incomplete.

Olea verrucosa, *Link.*—Macaliesberg, *Burke* s.n. Streydpoort, Makansberg, *Rehmann*, 5395 ; Houtbosch, *Rehmann*, 6476 ; Pretoria, Aapjiespoort, *Rehmann*, 4052 (rusty tomentose beneath). Also in Natal, Griqualand West, Graaf Reinet, Kaffraria, Somerset Paarl, Albany, Queenstown, Uitenhage, and Devil's Mt., Cape Town. On a label on a Cape Colony specimen (*Dr. Thom*, 751) is noted, " snuff made of the leaves employed to cure bleeding at the nose."

Olea Woodiana, *Knobl.*, in *Bot. Jahrb.* xvii. (1893) 532.—A Natal species, not taken up in the *Flora Capensis* and of which I have seen neither specimens nor description. There is at Kew a very large-leaved species from the Boschberg, Somerset Division, Cape Colony (*Burchell*, 3221), also found in the George and Knysna Divisions, which reminds me of a common tree of the Houtboschberg forests. We need flowering specimens for determination.

Schrebera argyrotricha, *Gilg.* in *Engl. Bot. Jahrb.* xxx. (1900) p. 74.—Lydenburg, " beim grossen Wasserfall ", Feb. 1893, *Wilms*, 201.

Schrebera Saundersiae, *Harv.* (syn. *S. latialata*, Gilg. in *Engl. Bot. Jahrb.* xxx. 1900, p. 73.)—Houtbosch, *Rehmann*, 5950, so named but may possibly be *S. argyrotricha* ; better material is needed. *S. alata*, Welw., of Angola, appears to be quite different, though united with *S. Saundersiae*, by some writers.

OLINIACEAE.

Olinia cymosa, *Thunb.*—No Transvaal material at Kew.

Olinia micrantha, *Decaisne.*—Macaliesberg, June, *Burke*, 494, fide E. Gilg. 1902 ; Graskop, near Pilgrim's Rest, upper edge of berg 4,750 ft. alt., *Davy*, 5220 ; Barberton, Upper Moodies, 4,500 ft., tree 30 ft., fls. pink, fruit pink (fls., Jan. 1891), *Galpin*, 1275 ; Elandspruit Berg, 5,500 ft., Dec. 12, 1893 (fls.), *Schlechter*, 3864 ex herb. Bolus ; Barberton, tree growing among rocks on hills 3,300 ft. alt., *Thorncroft*, 31 ; fls. " pink ", S. Africa, *Zeyher*, 308.

Olinia ternata, *Gilg.*—Pretoria, Groenkloof, 4,500 ft. alt., *Davy*, 3207 (not typical).

PITTOSPORACEAE.

Pittosporum Krugeri, *Engl.* in *Notizbl. Bot. Gart. Berlin*, II. 26, Dec. 1897.—Lydenburg, " kloof bei Steph. Schoeman's Farm ", Oct. 1887, *Wilms*, 213. Also in Natal.

Pittosporum viridiflorum, *Sims.*—Slang-kraal, near Crocodile River, Nov., *Burke* s.n. ; Houtbosch, *Rehmann*, 6513 ; Pretoria, colles supra Aapjies River, *Rehmann*, 4357.

PROTEACEAE.

Protea abyssinica, *Willd.*—I had not time to make any study of the Proteas at Kew, but Dr. Bolus notes that South African specimens at Kew are marked by Prof. Oliver as " probably *P. abyssinica*," and that Engler has assigned our common Transvaal Sugarbush

to that species. Rustenburg, common on slopes, forming a grove, May 24, 1903, flowers not plentiful, fragrant, visited by many ants, *Davy*, 144; Rustenburg, Aug. 1903, tree 12–15 ft. high, in groves together, *Miss A. Pegler*, 941 in herb. Bolus.

RHAMNACEAE.

Rhamnus Zeyheri, *Sond.*—The only Kew specimen is the type from the Magaliesberg.

RUBIACEAE.

The South African material of this family is badly in need of thorough revision, the following names should therefore be taken under reservation.

Adina Galpini, *Oliv.* (see *Ic. Plant.* 2386).—Shilouvane, "le long de la riviere Mooudi, arbre de 20–30 m., couleur vertjaune, Jan." *Junod*, 1431; Barberton, "tree 30–90 ft., the latter height along the river banks; Horo flats, Swaziland (2,000 ft. alt.); more stunted on Queen's River, Moodies, near Barberton (3,500 ft.) known as 'Cape Teak'; timber excellent, closely resembling teak," Jan. 1891, *Galpin*, 1213; Barberton, Nov. 1905, *P. Oranje* ("N'Hlomu") 3028; Spelonken, Nov. 16, 1906, Ceylon's Roos, "Mutulumi," *F. T. Menne*; Angola, Mossamedes, *Welwitsch*, 3028.

Adina microcephala, *Hiern.*—The Transvaal material at Kew, so named, is now referred to *A. Galpini*, Oliv.

Burchellia capensis, *R. Br.*—Transvaal, *J. H. McLea*, ex herb. Bolus, 5656; Barberton, summit of Saddleback Mt. 4,500-5,000 ft., fl. July, 1890, red, *Galpin*, 977; Swaziland, open kopjies among rocks, M'bahane, *Davy*; Natal, has a very extensive range from sea level up to 2,500 ft., *D. Sutherland.*

Cephalanthus natalensis, *Oliv.* See *Ic. Pl.* t. 1331.—Lydenburg, Waterval river, Nov. 1885 (fruit), *Wilms*, 1815; near Lydenburg, *Dr. W. G. Atherstone*, Dec. 1873, Jan. 1874 (type specimen !); Barberton, mountain sides, woody shrub 5–8 ft., fls. greenish white, fruit said to resemble a strawberry in appearance and to be edible—alt. 3,000–4,500 ft., fls. Sept. to Oct. 1889, *Galpin*, 534; Houtboschberg, 4,250–5,000 ft., border of forests, called "Matawda," *Davy*. Called "Quinine fruit" on a label at Kew.

Gardenia cornuta, *Hemsl.* in *Hook. Ic. Pl.* t. 2809.—Painting in herb. Kew, from Mrs. K. Saunders, marked "from Le Bombo, flowered at Eshowe, Dec. 1900," and named as above.

Gardenia Neuberia, *E. & Z.*—According to a note by Mr. N. E. Brown on a Kew sheet, this is synonymous with *G. Gerrardiana*, Sond. & Harv. No Transvaal material at Kew.

Gardenia Rothmannie, *L. f.*—Pretoria, Kuduspoort, *Rehmann*, 4668; Barberton, a tall tree at 4,000 ft. 16/12/03 (fls.), flowers white, *Legge*, 6 in herb. T. D. A.—agrees with Natal specimens at

Kew ; Botsabelo, Middleburg District, Transvaal, in saxos 1,600 m. 20/12/1893, *Schlechter*, 4080 ; Houtboschberg forests, *Davy* (called "Kalabash," from the size and shape of the fruits).

Gardenia Saundersiae, *N. E. Br.*—"Type raised at Tongaat, Natal, from seeds collected in the Lebombo Mts., Lourenzo Marquez, by Mr. Chas. Saunders" (in herb. Kew).

Gardenia Thunbergia, *L. f.*—No Transvaal material at Kew.

Grumilea capensis, *Sond.*—No Transvaal material at Kew. Barberton, a small tree, alt. 2,500 ft., fls. yellow, 16/12/03, *Legge*, 10, in T. D. A. herb.

Oxyanthus Gerrardi, *Sond.*—Houtbosch, *Rehmann*, 6013 ; Swaziland, Hoto concession, in woods, alt. 4,000 ft., tree 20 ft., fls. white, Dec. 1890, *Galpin*, 1262 in herb. Kew (broader leaves resembling those of *O. natalensis*, Sond.) ; Lydenburg (?), herb. T. D. A. ; Barberton, Legat, 2449A (Aug. 1904), Houtboschberg, common in dense shady forest, called "Wild Coffee," *Davy*.

Oxyanthus latifolius, *Sond.* ?).—Sabie-hoek forest, Lydenburg District, alt. about 4,100 ft., Jan. 27, 1906, *Davy*, 5221. Fls. and fruit needed ; may perhaps prove to be *O. natalensis*, Sond.

Pavetta caffra var. **pubescens**, *Sond.*—Houtbosch, *Rehmann*, 6016.

Pavetta Cooperi, *Harv. & Sond.*—Barberton, Reimer's Creek, alt. 4,500-4,800 ft., shrub 10 ft., fls. white, scentless, Dec. 1890, *Galpin*, 1201 ; Pretoria, Aapjiespoort, *Rehmann*, 4140 (doubtfully the same) marked "= *Nelson*, 411" on sheet in herb. Kew.

Pavetta disarticulata, *Galpin.*—Barberton, "hill sides among rocks, stunted tree 4 to 6 ft., cymes and leaves on very short stems springing from gnarled old-looking branches", fls. Aug., fruit 11/1889, *Galpin*, 406 ; Swaziland near Miles Hot Springs, alt. 2,500 ft., Jan. 1905 (fls.), *Davy*, 2902 ; Zululand, *Medley Wood*, 3954A in herb. Kew.

Pavetta lanceolata, *E. & Z.*—Lydenburg, near the town of Lydenburg, Oct. 1892, *Wilms*, 600.

Pavetta microlancea, *K. Schum.*—Komatiepoort, Dec. 15, 1897, *Schlechter*, 11760.

Pavetta Schumanniana, *F. Hoffm.*—Streydpoort, Makansberg, *Rehmann*, 5459. Leaves oblanceolate, obtuse, densely grey-tomentose ; Kew sheet marked "=Welwitsch 3190 !" which number is assigned by Hiern to this species ; Welwitsch collected it "in wooded thickets between Lopollo and Monino, Huilla, Angola."

Pavetta Zeyheri *Sond.*—Vaal River, May, *Burke & Zeyher*, 768 ; Pretoria District, "shrub," *Nelson*, 83 ; Pretoria, Aapiespoort, *Rehmann*, 4136, 4139 ; Pretoria, in collibus aridis prope Pretoria alt. ca. 4,500 ft., fl. Dec. 1905, *H. Bolus*, 11932.

Pavetta sp.—Pretoria, Aapiespoort, *Rehmann*, 4140, 4141; Houtbosch, *Rehmann*, 6021; Dwars River, Groot Spelonken, *Nelson*, 411.

Plectronia Gilfillani, *N. E. Br.* (ined).—Johannesburg, Jeppestown Ridge, 6,000 ft., Sept. 1889, fruit Dec. 1898, shrub 3–4 ft. high, *Galpin*, 6010 (leaves small, densely grey-tomentose, resembling those of a *Vangueria*); Pretoria, *Rehmann*, 4245 (colles supra Aapies river), 4143 (Aapiespoort), 4714 (Pretoria). ("Probably = *P. velutina*, Conrath MS. Conrath 343 seen at Kew 7/06," note by Dr. H. Bolus on Kew sheet). *P. Macleana*, Bolus MS. appears to be the same (based on *McLea*, Pretoria in collibus 4100 ped circa. Sept. 1875, ex herb. Bolus, 5655, in herb. Kew.

Plectronia Gueinzii (*Sond.*) *Szyszyl.* (*Canthium Gueinzii*, Sond.).—Barberton, 3,500 to 5,000 ft., "strong-growing climbing shrub, common in wooded ravines climbing up the highest trees, fls creamy white," Sept. 1889, *Galpin*, 519; Houtbosch, *Rehmann*, 6471; Houtboschberg, *Nelson*, 432, "in jungle, shrub H. B. B."

Plectronia mundtiana, *Pappe* (syn. *Canthium mundtianum*, Ch. & Schl.).—Pretoria, *Rehmann*, 4715; Macaliesberg, Dec., *Burke*, s.n.; Houtboschberg forests, *Davy*: The Willows, Pretoria, Nov. 12, 1904, *Davy*, 2529.

Plectronia pauciflora, *Klotzsch.*—No Transvaal material at Kew. Called "Witte Pear" in Cape Colony, *Cooper*, 1165.

Plectronia ventosa, *Hochst.* ?).—Houtboschberg forests, Zoutpansberg, alt. about 4,000–5,000 ft., *A. K. Eastwood.* (recd. Apr. 30, 1906. T. D. A. Herb. 2434). Agrees fairly well with *Burchell*, 7281, so named at Kew; Houtbosch, *Rehmann*, 6011.

Plectronia sp. nov.—Warm Baths, Jan. 1906, *Davy*, 5222; Rustenburg District ("Woodstock"), tree, 5–8 ft., masses small cream fls., Nov. 1903, *Miss Alice Pegler*, 2002, ex herb. Bolus. "Fls. very strong and objectionable scent." (*Miss K. Smith.*)

Tricalysia sp. (= *Banburya capensis*, Meissn.)—Barberton, summit Saddleback Range, fls. white, fruit scarlet, shrub, 8 ft., alt. 5,000 ft., *Galpin*, 1017 (narrow-leaved form not typical *B. capensis*; cfr. *T. Galpinii*, Schinz); Houtboschberg, *W. Nelson*, 495, intermediate form, perhaps *lanceolata* (?). Houtbosch, *Rehmann*, 6428, is the same as *Galpin*, 1017. The Galpin plant closely resembles *Baron*, 967, from Central Madagascar, labelled *Diplocrater* sp.

Tricalysia sp. (= *Kraussia lanceolata*, Sond., and *Carpothalis lanceolata*, E. Mey.).—Houtboschberg, Helpmakaar forest, 5,000 ft., *C. E. Legat* and *A. K. Eastwood*, Jan. 8, 1906. "Tol-baali", Patatabosch, Jan. 5, 1906, *Davy*. "Bark smooth, light brown, thick and corky, flaking off in chips; flowers small, solitary, white."

Trycalysia sp. (= *Kraussia pavettoides*, Harv.).—Drakensberg, Sabie-hoek forest, 4,100 ft., Jan. 27, 1906, *Davy*, 5223, may be

this; it resembles a specimen from Inanda, Natal. Placed in *Webera* at Kew. It should also be compared with *T. glabra*, Hiern.

Vangueria edulis, *Vahl.*—In fructicetis prope Potgieters Rust, alt. ca. 3,600 ft., Feb. 1904, *Bolus*, 11016. "This is an extra tropical outlier."

Vangueria euonymoides, *Schweinf.* Delagoa Bay, closely resembles *Kraussia lanceolata*.

Vangueria infausta, *Burch.*—Near Lydenburg, *Dr. Atherstone*, Dec. 1873.—Jan. 1874; Kalahari, *Burchell* (Klipfontein), frutex 5–10 pedalis; Delagoa Bay, *Forbes*; Natal, Bashee River, Fort Bowker, "on the skirtings of forests and kloofs." "Fruit ripens in Autumn; an excellent fruit tree—the fruit of this tree surpasses that of the English medlar," *M. E. Bowker*; Macalisberg, Nov., *Burke*, 250; in collibus circa Pretoria, *J. H. McLea*.

Vangueria latifolia, *Sond.*—All Transvaal material at Kew appears to be referred to *V. infausta*.

Vangueria longipes, *Conrath* MS. (type *Conrath*, 343).—Jeppestown Ridge, Johannesburg, about 6,000 ft., Dec. 1898, *D. F. Gilfillan*, ex herb. Galpin, 6118.

Vangueria parvifolia, *Sond.*—Crocodile River, Nov., *Burke* (lvs. small densely pubescent) type; Macaliesberg, fls. Nov., *Burke*; Johannesburg, ridges above Jeppestown alt. 6,000 ft., Oct. 1898, frts. Dec., *D. F. Gilfillan*, ex herb. Galpin, 6012; Pretoria, Aapiespoort, *Rehmann*, 4142; colles supra Aapies River, *Rehmann*, 4246.

Vangueria venosa, *Sond.*—Barberton, grassy fields, 2,800–3,000 ft., shrublet 12–24 inches high, Oct. 1890, *Galpin*, 1109.

SANTALACEAE.

Colpoon compressum, *Berg., Descr. Pl. Cap.* p. 38, t. 1, p. 1 (1767). (*Fusanus compressus*, Murray, *Syst. Veg.* ed. 13, p. 765 (1774). *Thesium colpoon*, Linn. f. *Suppl.* 161 (1781); Thunb. *Prod.* 46 (1794); and *Fl. Cap.* ed. Schultes, p. 211. *Euonymus colpoon*, Lam. *Encycl.* ii. p. 574 (1786). *Osyris compressa*, A. DC. in *DC. Prod.* xiv. p. 634 (1657)).—I am indebted to a MS. note in the Kew herbarium for these synonyms. The Transvaal material at Kew, at one time assigned here, is now referred to *Osyris abyssinica*; the foliage of the one resembles that of the other very closely. I have not yet collected it in fruit and am therefore unable to say with certainty that we have *Colpoon compressum* with us. Both are said to be used for tanning; the leaves of *Colpoon compressum* are at times exported in considerable quantity from Cape Colony, under the name of "Berg-bast" or "Cape Sumach." There are the following specimens at Kew:—Camps Bay, *Burchell*, 842, 368; Simons Bay, *Grey*, *Wright*; Table Mountain, near Cape Town, *MacOwan*, in Herb. Norm. Aust. Afr. 574, *Drege.*; near Grahamstown, *MacOwan*, 43; Natal, near Murchisons, *Wood*, 3004; Eastern Districts, *Cooper*, 50 (called "Bark Bosch," used for tanning leather); Uitenhage, *Ecklon & Zeyher*, 311; Mossel Bay

Burchell, 6245; Kromme River, in Humansdorp Div., *Burchell*, 4853; Somerset Div., mountains above Commadagga, *Burchell*, 3227; Plentenberg Bay, Knysna Div., *Burchell*, 5327; near Zoetemelks River, Riversdale Div., *Burchell*, 6629; near Lowrys Pass, Stellenbosch Div., *Burchell*, 8284.

Osyris abyssinica, *Hochst.*—Pretoria, Aapiespoort, *Rehmann*, 4051; Shilouvane, *Junod*, 523; Pretoria, and near Rustenberg, *Davy*; Abyssinia, called "Keraj", teste *Schimper* in herb. Kew; Somaliland, Gabadir Plain, "a tanning plant," called "Watta" *Gen. Swayne*, ex herb. Kew; Yemen, called "Sandel Kegje", *Schweinfurth*.

SAPINDACEAE.

Pappea capensis, *Eckl & Zeyher*.—This is quite different from our Transvaal tree and there is no Transvaal material of *P. capensis* at Kew; *Wilms*, 206, so labelled, is *Antidesma venosum*. The leaf of ours is much more like that of *P. Radlkoferi*, Schweinf., but smaller, it may be *P. Schumanniana*, Schinz (in *Verh. Bot. Ver. Brand.* xxx. 1888, 156), of which I have not seen named material. I have collected our species at East Fort and Wonderboompoort near Pretoria, and in the Bushveld of the Waterberg District near Warm Baths and Potgieter, but it is by no means a common species with us. Rehmann collected it at Streydpoort in the Makapansberg (No. 5460) and at the Aapiespoort near Pretoria (4007). Lobengula's "Judgment Tree" near Bulawayo may be this species.

SAPOTACEAE.

Sideroxylon inerme, *L.*—Pretoria, hills 4,200 ft. alt., shrub about 10 ft. high, *McLea*, in herb. Bolus, 5698. Also east of the Drakensberg.

SIMARUBACEAE.

Kirkia Wilmsii, *Engl.* in *Notizbl. Bot. Gart. Berlin*, v. 2, p. 25, Dec. 1897.—Roodepoort, Warm Baths, alt. 3,700 ft., Jan. 1906, *Davy*, 5224; Barberton, dry hillsides 2,800 to 3,000 ft. alt., tree 10 to 15 ft., Nov. 1889, *Galpin*, 691 in herb. Bolus.

UMBELLIFERAE.

Heteromorpha arborescens, *Ch. & Schl.*—There are no Transvaal specimens of typical *H. arborescens* at Kew, and ours may be an undescribed species; it appears to be distinct.

Heteromorpha glauca, *Engl.*—Lydenburg, *Wilms*, 563; Rensburg's farm near Pretoria, *Wilms*, 563b (the leaflets very narrow).

Peucedanum (**fraxinifolium**, *Hiern.* ?).—Barberton, tree 10 ft. high, 9 in. diameter, *Galpin*, 637; resembles the Somaliland form, so named at Kew.

URTICACEAE.

Pouzolszia hypoleuca, *Wedd.*—Appears to be a very variable species. Magaliesberg, near the Wonderboom, *Davy*, 2646;

Komatiepoort 1,000 ft., *Schlechter*, 11758. Also in Nyasaland, and there very variable. *Dr. Holub's* 1351, 1352 and 1353 from the Makalaka country seem rather different from ours.

Urera tenax, *N.E. Br.*; Urera fibre tree.—Rustenberg District, plentiful in stony ground on the hills on farms Welgevonden, 159 and Doornkloof, 624, near the junction of the Pienaars and Crocodile Rivers, *W. R. Lanham* (in T. D. A. herb.).

HERBACEOUS PLANTS AND SUB-SHRUBS.

Alysicarpus vaginalis, *DC.*—Pigg's Peak, Swaziland, May, 1906, *Dr. Penny*, in T. D. A. herb. 2388, supposed to have been used in a case of criminal poisoning, but there is no note on any of the numerous specimens at Kew that it is poisonous. The flowers are described as "blue" on a specimen from Nupe, Niger, collected by Barter, who notes that it is "a pest in some cultivated soils." Collectors often note that it grows in or near cultivated ground or villages. Apparently an exceedingly variable species as regards habit and leaf outline.

Nidorella hottentotica, *DC.*—Prope Pretoria in campis, 4,000 ft., Sept. 1875, *J. H. McLea*, ex herb. Bolus, 3115; Blaauwbank, *Nelson*, s.n., Aug. 1880; Pretoria, Meintjes Kop, *Davy*, 6; a common and untidy weed.

Nidorella resedaefolia, *DC.*—Becoming increasingly abundant as a weed in cultivated ground, near Christiana 4,100 ft., *Davy*, 1611; near Nylstroom 3,500 ft., *Davy*, 2111; Willow Park, Zeerust, *Davy*, 92.

Phyllanthus parvulus, *Sond.*—Aapjies River, *Zeyher*, 1508 (type); *Burke*, Oct.

Phyllanthus glaucophyllus, *Sond.*—Macaliesberg, Nov., *Burke; Zeyher*, 1509 (type).

Phyllanthus genistoides, *Sond.*—Macaliesberg and Aapjies River, Oct., *Zeyher* (type).

Phyllanthus tenellus, *Muell.*—Vaal River fields, *Nelson*. s.n.

Phyllanthus Niruri, *L.*—Barberton, hillsides 3,000 ft., Sept. 1889, *Galpin*, 566; "Transvaal," *Sanderson*; Bushveld, Klippan, *Rehmann*, 5337.

XXII.—PLANT IMPORTATION INTO JAMAICA.

From the Proclamation issued by the Governor of Jamaica, which is printed below, it will be seen that the prohibition against the importation of plants, seeds, &c., into Jamaica from the Old World has now been withdrawn, but the imported plants and seeds must be fumigated in accordance with the published instructions.

The following papers on this subject have been received through the Colonial Office :—

COLONIAL OFFICE to ROYAL BOTANIC GARDENS, KEW.

Downing Street,
3rd January, 1908.

SIR,

WITH reference to the letter from this Department of the 20th February, 1888, I am directed by the Earl of Elgin to transmit to you for your information the enclosed copy of a despatch from the Governor of Jamaica on the subject of the importation into the Colony of plants, seeds, &c., from certain portions of the British Empire.

I am, etc.,
(Signed) C. P. LUCAS.

The Director of the Royal Gardens, Kew.

The GOVERNOR of JAMAICA to COLONIAL OFFICE.

King's House, Jamaica,
11th December, 1907.

MY LORD,

WITH reference to Sir H. W. Norman's despatch No. 445, of the 23rd December, 1887, I have the honour to inform your Lordship that, under the power given by "The Seeds and Plants Importation Law, 1884," I have by Proclamation revoked the proclamation of 2nd December, 1887, prohibiting the importation into this island of seeds or plants or any description of earth or soil or any article packed therewith that may have come either directly or indirectly from Natal, South India, Ceylon, Mauritius, Java and Fiji, and have in the same Proclamation (two copies of which are annexed) prescribed the conditions under which alone the importation of any of the articles specified shall be permitted that may have come from any of the countries mentioned.

2. I have taken this action on the recommendation of the Director of Public Gardens and Plantations, the Board of Agriculture, the Jamaica Agricultural Society, and the Commissioner of Agriculture for the West Indies, and shall be glad if your Lordship will be so good as to cause the Director of the Royal Gardens, Kew, to be informed of it.

The immediate cause was a representation from Mr. Fawcett that as the last consignment of Para Rubber was not quite successful, planters were asking that the Proclamation against Ceylon and other places might be withdrawn, and Mr. Fawcett added that he had consulted the owners of the most important of the Blue Mountain Coffee estates and that they agreed that there would be no danger now to our coffee of infection with *Hemileia vastatrix*.

I have, etc.,
(Signed) SYDNEY OLIVIER,
Governor.

The Right Honourable
The Earl of Elgin, K.G., etc., etc.

(ENCLOSURE.)

(Signed) SYDNEY OLIVIER.

(L.S.) By His Excellency Sir Sydney Olivier, Bachelor of Arts, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Captain-General and Governor-in-Chief in and over the Island of Jamaica and its Dependencies.

A PROCLAMATION.

WHEREAS it is enacted by the First Section of Law 4 of 1884,—"The Seeds and Plants Importation Law, 1884"—that it shall be lawful for the Governor to revoke or vary any Proclamation made by him under that section;

AND WHEREAS General Sir Henry Wylie Norman, G.C.B., G.C.M.G., C.I.E., Captain General and Governor-in-Chief in and over the Island of Jamaica and its Dependencies, by Proclamation made on the 2nd day of December, 1887, prohibited until further Proclamation the importation into this Island of seeds or plants or any description of earth or soil or any article packed therewith that may have come either directly or indirectly from any of the following countries, viz.: Natal, South India, Ceylon, Mauritius, Java and Fiji.

NOW, therefore, I, the Governor, do hereby revoke the aforementioned Proclamation bearing date the 2nd day of December, 1887, and I hereby proclaim that I prescribe the following conditions as conditions under which alone the importation of any of the articles aforesaid shall be permitted that may have come either directly or indirectly from any of the countries aforesaid, viz.: That all such articles (including seeds) imported from the aforementioned countries shall be fumigated in accordance with the instructions published in the *Jamaica Gazette* of the 9th January, 1902.

Given under my hand and the Broad Seal of this Island at Head Quarters House, Kingston, on the eleventh day of December in the seventh year of His Majesty's reign Annoque Domini 1907.

By Command,

(Signed) H. CLARENCE BOURNE,
Colonial Secretary.

(EXTRACT from the *Jamaica Gazette*, January 9, 1902.)

Instructions for the Guidance of Officers of the Government Laboratory and Kingston Customs in regard to the manner in which imported Plants, Cuttings, &c., and their coverings shall be dealt with.

Immediately on the landing of any plants, cuttings or other articles, specified in the Governor's Proclamation of the 7th September, 1901, published in the Government Notice No. 278, of the 10th of that month, in the *Jamaica Gazette*, they shall be taken charge of by the Customs Officer, who will give the Wharfinger, or other party concerned, a receipt therefor, showing the time and date of delivery.

The Customs Officer shall at once notify the Government Chemist, in writing, of the articles to be fumigated, stating the approximate dimensions thereof and obtain his instructions as to the time at, and place to, which they are to be forwarded for fumigation.

The Customs Officer will then forward the articles accordingly in charge of a Customs Escort, who will remain in attendance during the process of fumigation and afford, or provide such assistance and labour as the Government Chemist or his officer in charge may require.

Immediately on receipt of the Articles the Government Chemist (or his Assistant) shall cause them to be fumigated in the manner and under the conditions prescribed by the Governor in Privy Council.

So soon as this has been done, and a memorandum showing the time of receipt and delivery furnished to the Customs Escort, the Articles shall be taken charge of by the Escort and conveyed to the King's Warehouse or other place, as arranged by the Landing Waiter.

The greatest care must be taken by the Officer in charge of the King's Warehouse to keep plants, cuttings, &c., alive and in good condition.

All expenses of removing the articles to the Government Laboratory, and thence to the King's Warehouse, with any expenses necessarily incurred in keeping the articles in good condition, shall be met by the Importer, all such amounts being brought to account as King's Warehouse Fees as provided by the Customs Regulations on the subject.

Plants, cuttings, &c., should not be forwarded to the King's Warehouse in cases where Importers defray expenses of removal, labour, &c. (if any) at once, and at the same time arrange with the Customs Officer to take delivery of the articles immediately after fumigation. This provision will refer more particularly to the plants, &c., brought by passengers and imported through the parcel post, &c.

Officers of Customs and of the Laboratory are required to exercise strict economy in arranging for the transport of the plants, &c., and other expenses, so that the charge to the Importers may be as small as possible.

XXIII.—DECADES KEWENSES

Plantarum Novarum in Herbario Horti Regii Conservatarum.

DECAS XLIX.

481. **Sterculia (Eusterculia) Henryi**, *Hemsl.* [Sterculiaceae—Sterculieae]; *S. coccineae*, Roxb., proxima, a qua differt floribus majoribus vere racemosis et pedunculis pedicellisque minus gracilibus.

Frutex 3-pedalis, novellis ferrugineo-puberulis. *Rami florigeri* teretes. *Folia* ad ramorum apices conferta, petiolata, papyracea, oblonga vel lanceolato-oblonga, absque petiolo 15–25 cm. longa, 4–6 cm. lata, basi rotundata, apice acuminata, integra, glabra; venae subtus conspicuae, primariae utrinque circiter 15, curvatae, paullo intra marginem anastomosantes; petioli teretes, 2·5–5 cm. longi. *Flores* unisexuales vel polygami, rubescentes, racemosi; racemi numerosi, in foliorum axillis vel interdum ad apices ramorum defoliatorum in axillis bractearum conferti, 5–15 cm. longi. ferrugineo-pilosuli, pilis stellatis, graciles, suberecti; bracteae lineari-lanceolatae, pedicellos aequantes, acutae, cito deciduae; pedicelli 0·5–1 cm. longi. *Calycis segmenta* fere ad basin libera, ferrugineo-puberula, anguste lanceolata, 1·75–2 cm. longa, infra medium circiter 4 mm. lata. *Stamina* 10; columna glabra, circita 4 mm. longa, recurva. *Pistillum* hirsutum, cum columna glabra 6–7 mm. longum; stylus hirsutus, recurvus; antherae cassae, ovario arcte appressae. *Fructus* ignotus.

China. Yunnan; mountain forests S.E. of Mengtze at about 1,500 m., *A. Henry*, 11016.

482. **Sterculia (Eusterculia) scandens**, *Hemsl.* [Sterculiaceae-Sterculieae]; species ex affinitate *S. nobilis*, R. Br. et *S. Balanghas*, Linn., sed ab utraque foliis majoribus venis primariis lateralibus numerosioribus, floribus majoribus et calycis tubo brevi differt.

Frutex scandens, praeter inflorescentiam glaber vel cito glabrescens, ramis florigeris rectis crassis glabrescentibus sulcatis. *Folia* simplicia, papyracea, petiolata, oblonga vel lanceolata, absque petiolo 15–40 cm. longa, 12–15 cm. lata, interdum nonnulla superiora 8–10 cm. tantum longa, basi rotundata, acuminata, integra; costa crassa, utrinque, praecipue subtus, elevata; venae primariae conspicuae, in foliis majoribus utrinque, 17–20, curvatae, juxta marginem inter se conjunctae; petioli teretes, basi apiceque leviter incrassati, usque ad 12 cm. longi, sed saepius breviores. *Flores masculi* rosei, pilosi, pilis stellatis, circiter 2 cm. diametro, in foliorum superiorum axillis paniculati; paniculae angustae, graciles, erectae, 10–20 cm. longae, bracteis nullis vel citissimo decidius, sed interdum foliis paucis 4–5 cm. longis instructae; pedicelli filiformes, floribus breviores. *Calycis segmenta* e basi lata lineari-lanceolata, 2–2·5 cm. longa, acuminatissima, arcuata, apice cohaerentia. *Stamina* 10; columna brevis, gracilis, recurva, antheris deorsum spectantibus. *Flores feminei* carent.

Tonking. Laokai, *E. H. Wilson*, 2796 ; *A. Henry*, 13643, collected by Mr. Wilson.

483. **Euonymus Balansae**, *Sprague* [Celastraceae] ; affinis *E. subsessili*, Sprague, a quo ramulis tuberculatis, petiolis longioribus, fructibus majoribus longiaculeatis recedit.

Frutex glaber, ramis gracilibus pendulis (teste *Balansa*), ramulis gracilibus quadrangularibus dense minute tuberculatis. *Folia* lanceolata, basi cuneata, apice acute acuminata, 5–10 cm. longa, 2–4 cm. lata, serrulata, tenuiter coriacea, in sicco griseo-viridia, subconcolora, basi subtriplinervia, nervis lateralibus utrinque 6–7 patulis satis intra marginem anastomosantibus supra in foliis junioribus manifestis in vetustis inconspicuis subtus prominulis ; petioli 4–6 mm. longi. *Gemmae* ovoideae, circiter 5 mm. longae, purpureo-brunneae, perulis ciliolatis. *Dichasium* quater furcatum, pedunculo sub fructu circiter 1·3 cm. longo. *Flores* ignoti. *Capsula* brunnea, circiter 1·7 cm. diametro, aculeis inclusis ; aculei subulati, inferne ± compressi, 3–4 mm. longi. *Semina* in arillo omnino inclusa.

Tonkin. On calcareous rocks at Dong-Dang, *Balansa*, 1451.

484. **Euonymus Wilsonii**, *Sprague* [Celastraceae] ; affinis *E. actinocarpo*, Loes., a quo petiolis subtriplo longioribus, foliis majoribus laxius serrulatis pro rata angustioribus recedit.

Frutex sempervirens, scandens, glaber, ramis cinereis, ramulis gracilibus pallide viridibus paullulo costatis. *Folia* lanceolata, basi cuneata, apice longiuscule acuminata, 8–15 cm. longa, 2–4 cm. lata, laxiuscule serrulata, tenuiter coriacea tantum, discolora, basi triplinervia, nervis ceteris lateralibus utrinque 5–8 patulis vel obliquis satis intra marginem arcuatim connexis supra vix impressis subtus prominentibus vel prominulis ; petioli graciles, 1–1·5 cm. longi. *Pedunculi* 2–4 cm., sub fructu usque ad 5·5 cm. longi, anguste alati. *Dichasia* ter vel quater furcata. *Pedicelli* 4–5 mm. longi. *Flores* masculi (functione) tantum cogniti, 8–8·5 mm. diametro. *Calyx* 3·5–4 mm. diametro sparse glanduloso-ciliolatus. *Petala* suborbicularia, vix ultra 3 mm. diametro. *Discus* 2·5 mm. diametro. *Filamenta* triangulari-subulata, 0·4–0·5 mm. longa ; antherae 0·4–0·5 mm. longae, circiter 0·8 mm. latae, lobis suborbicularibus. *Ovarium* 4-loculare, obtuse tetragonum, prominulum, minute papillosum, styli brevissimi obtusissimi apice vix ultra 0·5 mm. supra discum elevato, ovulis pro loculo binis collateralibus descendentibus. *Capsula* fulva, leviter depressa, 2 cm. diametro vel paullo ultra, aculeis inclusis ; aculei subulati, ± compressi, 4–6 mm. longi. *Semina* in arillo omnino inclusa, circiter 1 cm. longa (nuda 8 mm. longa).

Western China. Mt. Omi, *Wilson*, 4788 ; without precise locality, *Wilson*, 3330.

485. **Boea lanata**, *Hemsl.* [Cyrtandraceae] ; inter species melanesias hucusque cognitas foliis ovatis petiolatis densissime sericeo-lanatis et cymis multifloris distincta.

Herba perennis, subscaposa, vix pedalis. *Folia* pauca, conferta, petiolata, crassa, late ovata, absque petiolo 4–8 cm. longa, obtusa,

basi rotundata vel subcordata, obscurissime denticulata, utrinque densissime appresso-lanata, mollissima, supra argentea, subtus fulva, venis primariis lateralibus utrinque circiter 7, subtus sat conspicuis ; petioli crassi, fulvo-lanati, 2–3·5 cm. longi. *Flores* parvi, in cymas densas compositas pedunculatas circiter 15 cm. diametro dispositi. *Inflorescentia* omnino piloso-hirsata. *Bracteae* angustae, quam flores breviores. *Calyx* dense albo-pilosus ; segmenta lanceolata, 6–7 mm. longa, acuta, erecta. *Corolla* subbilabiata, circiter 1 cm. longa. *Stamina* 2 ; filamenta brevia, carnosa, dolabriformia ; antherae magnae, arcte conniventes. *Ovarium* pubescens. *Capsula* linearis, matura ignota.

Solomon Islands. Florida, growing on rocks, *C. M. Woodford.*

486. **Pogostemon (Paniculata) Griffithii,** *Prain* [Labiatae-Satureineae] ; species distincta foliis eis *P. elsholtzioidis*, Benth., simillimis sed floribus potius *P. Heyneano*, Benth., affinis.

Herba erecta, ramosa, ·5–1 m. alta. *Caules* ramique graciles, obscure 4-goni, appresse puberuli vel pubescentes. *Folia* ramisque opposita, decussata, membranacea, ovato = vel oblongo-lanceolata, apice acuminata, basi cuneata, margine basi integro excepto serrata, utrinque sed praesertim subtus secus nervos parce subappresse pubescentia, 10 cm. longa, 2·5–3 cm. lata ; petioli 1 cm. longi, appresse puberuli. *Verticillastri* in spicis simplicibus 2–6 cm. longis 8 mm. latis caules ramosque terminantibus aggregati, interiores internodiis 5 mm. longis remoti, superiores approximati. *Calyx* anguste campanulatus, 4 mm. longus, extra parce pubescens, lobis 5 anguste triangulis aequalibus tubo duplo brevioribus. *Corolla* carnea, 7 mm. longa lobo antico ceteris parum majore, glabra. *Filamenta* subadscendentia, barbata. *Styli* rami subaequales, 2·5 mm. longi. *Nuculae* ovoideae, glabrae.

Burma. Hukung Valley, between Keouk Seik and the Serpentine Mines, 100–150 m., *Griffith*, 3962 [K.D.]

This species, though very different in respect of inflorescence, bears, as regards leaves, a close resemblance to *P. elsholtzioides*, and was distributed under that name, with the number quoted above, in 1862–3.

487. **Rheum globulosum,** *Gage* [Polygonaceae-Rumiceae] ; species nana, in grege *Deserticolarum* cl. Maximowiczio proposito ponenda, a caeteris tamen hujus gregis statura minima, habitu 1–foliato, inflorescentia globoso-capitata magnopere differt.

Herba nana, acaulis, glabra, vix 7 cm. alta. *Rhizoma* incrassatum, breve, repens, collo 6 mm. diametro, stipularum scariosarum brunnearum reliquiis dense vestito. *Folium* solitarium, petiolatum e rhizomatis apice cum pedunculo evolutum ; lamina reniformis vel reniformi-orbicularis, basi cordata vel sinuata, apice obtusa vel subacuta, margine integra vel obscure lobata, coriacea, pallide viridis, utrinque sed praesertim supra corrugata, 1·2–2 cm. longa, 2–3 cm. lata ; petiolus 2 cm. longus, in faciem laminae inferiorem radiatim in nervis latis regulariter iterum bifurcatis productus. *Inflorescentia* simplex, globoso-capituliformis ; capitulum 1·2–2 cm. diametro ; pedunculus 3·8–5 cm. longus, terminalis. *Flores* breviter pedicellati, 6 mm. longi. *Perianthii*

segmenta saepissime 6, exteriora 2 caeteris majora, marginibus alba, centro viridia, linea centrali in tuberculo minimo dorsali prope apicem segmenti terminante. *Stamina* 8–9, subaequalia, perianthii segmentis aequilonga. *Ovarium* 3-quetrum ; styli 3, brevissimi ; stigmata capitata. *Fructus*, vix maturus, 3-alatus.

TIBET. Khamba ; near Khambajong, 4650 m., *Younghusband*, 92.

This striking little species was collected by Col. Sir F. E. Younghusband, on behalf of the Royal Botanic Garden, Calcutta, during the earlier phase of the Tibet Mission.

488. **Rheum laciniatum**, *Prain* [Polygonaceae - Rumiceae] ; species elata, in grege *Monticolarum* cl. Maximowiczio proposito ponenda, certissime *R. officinali*, Baill., et *R. palmato*, Linn., proxima, foliis tamen intricate dissectis ab ambobus facillime distinguenda.

Herba elata, caule folioso. *Folia* membranacea, pallide viridia, utrinque sed praesertim subtus plus minusve scabriuscula, palmatim segmentis irregulariter 1–2-pinnatim divisis 5-secta, ambitu oblongo-ovata, majora 36 cm. longa, 24 cm. lata ; segmenta basalia lateralibus dimidio, lateralia centrali iterum fere dimidio breviora, laminis omnium in pterygomata angusta subconformia secus nervos expansa reductis ; basalia 10 cm. longa, 8 cm. lata, lobis 3–4-jugis majoribus 4 cm. longis 2 cm. latis, laciniis majoribus ·75 cm. longis ·25 cm. latis ; lateralia 20 cm. longa, 16 cm. lata, lobis 8–10-jugis majoribus 8 cm. longis 7 cm., latis, laciniis majoribus 4 cm. longis ·75 cm. latis ; segmentum centrale 36 cm. longum, 20 cm. latum, lobis 12–15-jugis majoribus 15 cm. longis 8 cm. latis, laciniis majoribus 6 cm. longis 1·5 cm. latis ; pterygomata ·45–·75 cm. lata ; petiolus 12–15 cm. longus, semi-cylindricus, scabriusculus ; ocrea 7 cm. longa, membranacea, extra scabriuscula. *Inflorescentia* paniculata, pyramidalis, ultra 40 cm. longa, rhachide ramisque primum parce scabriusculis, demum glabrescentibus. *Flores* parvuli, breviter pedicellati. *Perianthii segmenta* saepissime 6, subaequalia, herbacea, pallide viridia, apicibus conniventia. *Stamina* 8–9, aequalia, perianthii segmentis dimidio breviora. *Ovarium* 3-lobum ; styli 3, distincti, recurvi ; stigmata capitata. *Fructus* ignotus.

CHINA. Szechuen, in ravines, 3300 m., *Wilson*, 4415.

Mr. E. H. Wilson, who collected this species on behalf of Messrs. J. Veitch & Sons, in ravines, at 10,000 ft., in Western China, states that it is rare.

489. **Asplenium bireme**, *C. H. Wright* [Filices-Polypodiaceae] ; *A. Wrightii*, Eaton, proximum, rhachide costaque villosis differt.

Stipites caespitosi, 30 cm. longi, castanei, sparse villosi. *Frondes* oblongo-acuminatae, apice pinnatifidae, infra simpliciter pinnatae, 45 cm. longae, 15 cm. latae ; pinnae alternae, sessiles, oblongo-acuminatae, 10 cm. longae, 1·5 cm. latae, basi inferiore rotundatae, basi superiore auriculatae, costa dense brunneo-villosa, venis uni-vel bi-furcatis. *Sori* ad furcam superiorem cujusque fasciculi venarum affixi, leviter curvati.

CHINA. Tai-mo-shan, *E. H. Wilson* and *W. J. Tutcher*.

490. **Cassebeera Woodfordii**, *C. H. Wright* [Filices-Polypodiaceae]; *C. pinnatae*, Kaulf., proxima, sed planta proceriore pinnisque sterilibus profunde inciso-serratis differt.

Caudex 1 cm. crassa, radicibus ferruginoso-tomentosis vestita. *Stipites* caespitosi, 20 cm. alti, 2 mm. diam., castanei, glabri, nitidi; lamina pinnata, deltoidea, coriacea, glabra, ad 30 cm. longa, pinnis infimis bifurcatis; rhachis stipiti similis; pinnae breviter petiolatae, lineares, acuminatae, 15–20 cm. longae, 5 mm. latae, inciso-serratae, passim segmentis linearibus 2–4 cm. longis instructae. *Sori* recti vel leviter curvati, 3–6 mm. longi.

Solomon Islands. Tulagi, Florida Island, *C. M. Woodford.*

XXIV.—ECONOMIC NOTES: LIVERPOOL.

J. M. Hillier.

Of the varied Vegetable Products noted in a recent visit to the City of Liverpool the following may be recorded as supplementary to those referred to in the *Kew Bulletin*, No. 2, 1907, p. 61.

Miscellaneous Products.—In the West African dock sheds several forms of Piassaba (*Raphia vinifera*) were seen, viz.: "Calabar" in cylindrical bales 5 ft. in length and weighing about 1½ cwt. "Grand Bassa" in 3½ ft. lengths; "Junk River" similar in appearance and staple to "Grand Bassa," but more scraggy; "Sherboro" in bundles of about ¾ cwt. and 2½ ft. in length, generally of superior quality to the foregoing, being of finer texture, even, and better prepared; "Bereby" in 7 feet lengths securely bound with galvanised iron wire into bales of 2 cwt.

Palm Kernels in 2½ cwt. bags from Sierra Leone and Lagos, the latter being the cleaner of the two. Pods of *Acacia arabica* in 1½ cwt. bags, used for tanning. Large quantities of Maize from Lagos in 2½ cwt. bags. Capsicums from the Lagos District in 2½ cwt. bags. In commerce the larger fruits are known as Capsicums, whereas the small fruits are classified as Chillies.

Cotton Seed from Lagos in ¾ cwt. bags, and Cotton Seed Cake, a new import from the neighbourhood of Benin, consisting of trash, the Cake containing about an equal admixture of Seed and Cotton. Bales of Cotton from Lagos weighing 3¾ to 4 cwt., well banded with hoop iron, similar to the form in which Egyptian Cotton is exported. Gum Copal from Lagos of mixed quality in 1½ cwt. bags.

"Cocoa Beans" from Lagos were in quantity, and also commercially distinguished forms from the Gold Coast and Cape Coast; the latter being exceptionally clean and carefully prepared. On the other hand some bags from Lagos consisted of trash, being full of weevils, decayed and dirty.

Copra, the dried kernel of the Cocoa Nut, in 1½ cwt. bags from Cape Coast. Ground Nuts in ¾ to 1 cwt. bags were observed from various ports on the coast; these were both decorticated and undecorticated. Rufisque Nuts yield the best oil, used for the manufacture of Margarine. Palm Oil from Sherboro in 15 cwt. casks.

Oil Beans in 28 lb. bags were recognised as the seeds of *Pentaclethra macrophylla*, a note upon which appeared in the *Kew Bulletin*, No. 5, 1906, p. 176. Samples of these seeds have frequently been received at the Museum from Liverpool for determination, and though enquiries for them have been made by Liverpool merchants, they do not appear to be obtainable in quantity, probably from the fact that the natives of the West Coast employ them as food.

Some putrid-looking rubber with an offensive odour ("Niger Niggers") was noted in flat bags of about 1 cwt.

Other products observed in the docks were :—Crates of Canary Bananas and boxes of Tomatoes (four to the crate) from Teneriffe; casks of Cocoa Nut Oil, each weighing about 1,500 lbs.; Red American and mixed American Wheat, being weighed into sacks of 250 lbs.; Mixed White and Yellow American Maize collected from the floor and weighed into sacks of 240 lbs. by machinery; Tomatoes (preserved in tins) from Philadelphia; oblong boxes of Californian Apples, and also an immense number of casks of American and Canadian Apples.

TIMBERS.—Of the enormous quantities of timber to be seen in the docks the following were specially noted :—Lagos Mahogany in squared logs of 12 to 20 ft.; Birch, Maple, and Cottonwood planks from Canada. Pine planks in various sizes from Canada, probably derived from *Pinus Strobus* and *P. resinosa*. Large quantities of railway sleepers, bundles of broom handles of Ash from Canada, also bundles of dowels of Poplar in several sizes from the United States and Canada. These are employed in furniture making. Shooks in bundles of 25 to 30 of Satin Walnut (*Liquidambar styraciflua*) for kegs for nails and for soft soap. Boards $\frac{1}{2}$ inch thick of American Whitewood (*Liriodendron tulipifera*) used in the manufacture of bedroom furniture. Baulks in the round, with the bark removed, of American Walnut (*Juglans nigra*) in 7 to 20 ft. lengths, painted red on the ends to prevent splitting. Canadian Rock Maple (*Acer saccharinum*) in varying lengths of 4 to 12 feet, tongued and grooved for wood flooring. American Whitewood converted for electric light casings. In addition to the above, large consignments of Canadian Rock Maple were coming in for the manufacture of mangle rollers. For this application the wood is imported shaped octagonally and is immediately stored in the dark and packed in sawdust until required for conversion. This is done to prevent checking (surface cracks). These rollers are made chiefly at Keighley and Accrington, and one firm alone will produce as many as 300,000 rollers during the course of a year.

Under the guidance of Mr. Robert Gardner and Mr. Edmund Sergeneson, of Messrs. Joseph Gardner & Sons, the well-known Hardwood Merchants of Bootle, Liverpool, a visit was made to the extensive timber yards of the firm. Of the great variety of timbers to be seen here in bulk, the following commercial varieties were specially noted :—

Caucasian Yew.—Squared in 7 to 9 ft. lengths, 1 ft. 2 ins. to 2 ft. 2 ins. in diam. at butt. This was a new import.

Walnut, Turkish.—Squared in 6 to 9 ft. lengths, 2 ft. 6 ins. in diam.

Walnut, Circassian.—Squared and of similar size to the Turkish variety. This wood was also observed in planks; it is considered superior to the Turkish wood and is of better figure.

Walnut, Italian.—In planks 10 ins. to 2 ft. 4 ins. width and 2½ to 5 ins. thick. Very defective as a rule.

Lignum Vitae, Maracaibo.—In round logs with the bark on in 5 to 12 ft. lengths, varying in diam. from 6 ins. to 2 ft. Very liable to cup-shake.

Lignum Vitae, San Domingo.—In appearance like roughly hewn railway sleepers, 12 to 18 ft. lengths, 8 to 12 ins. in thickness.

Lignum Vitae, Cuba.—In round logs up to 6 ft. One fine log was observed 3 ft. in diam.

Lignum Vitae, Jamaica.—This consisted of small wood, clean and well grown. The wood of larger size is generally too defective for use. Chiefly used for pulleys.

Lignum Vitae, Bahamas.—In short lengths of 2 to 3 ft. and 2 to 5 ins. in diam. This differs from the foregoing in being nearly all sapwood.

Ebony, Maracaibo.—In the round with bark on in 6 to 9 ft. lengths, 9 to 18 ins. in diam. Chiefly used for door knobs and finger plates.

Ebony, Macassar.—In round logs with the sap chopped off.

Ebony, Mozambique.—In small logs 2½ to 4 ft. in length, 4 to 9 ins. in diam. Very defective and of irregular shape, particularly favoured by amateur turners.

Ebony, Gaboon.—In roughly cleft billets 3 to 4 ft. in length, 2½ to 8 ins. in diam. About 45 pieces go to the ton.

Ebony, Cameroon.—Similar to the Gaboon variety in 3 to 3½ ft. lengths, 2½ to 7 ins. in diam. This ranks next to the Gaboon in commercial value. About 50 pieces go to the ton.

Ebony, Rio del Rey.—In irregular logs 2½ to 3 ft. in length, 4 to 7 ins. in diam. The wood is of good texture, but somewhat brown in colour and considered one of the inferior forms of Ebony, averaging 45 to 60 pieces to the ton.

Boxwood, Abassian.—In irregular round lengths of 3 to 3½ ft., 5 to 12 ins. in diam. In demand for engraving purposes.

Boxwood, East London.—In irregular lengths of 4 to 5 ft., 2 to 8 ins. in diam.

Boxwood, Knysna.—In the round with the bark on, in lengths of 20 ft., 4½ to 8 ins. in diam. Used chiefly for weaving shuttles.

Boxwood, Persian.—In 6 ft. lengths, 2 to 4 ins. in diam. A larger form was noted in 3 to 4 ft. lengths, 4 to 8 ins. in

diam. The small wood is used in turnery and for rollers employed in flax spinning, the larger wood being used for weaving shuttles and common engravings.

Boxwood, Turkish.—In 2 to 4 ft. lengths, varying from 1½ to 6 ins. in diam.

Boxwood, West Indian or Zapatero Wood.—In the round in 6 to 10 ft. lengths and 5½ to 12 ins. in diam. This form is almost invariably split, especially in the larger pieces.

Osage Orange or Bois d'arc.—In the round with the bark on, in lengths of 6 to 8 ft., 12 to 18 ins. in diam. Imported from the U.S.A. Used for motor spokes, golf sticks, &c.

Rosewood, Bahia.—In the round in 10 to 12 ft. lengths, varying in diam. from 7 to 18 ins. Very liable to decay in the centre.

Greenheart.—Some fine baulks of this timber were observed, about 40 ft. long. It is valued for the manufacture of fishing rods and for various other purposes on account of its strength and durability.

Degame Lancewood, Cuba.—In 14 to 16 ft. lengths, 6 to 9 ins. in diam. at the small end and about 18 ins. in diam. at base. Used for shafts and for dye sticks as the wood contains no colouring matter and resists the action of acids, &c.

Mahogany, Cuba.—In the round in 8 to 16 ft. lengths, 8 to 16 ins. in diam. This wood is more often imported squared.

Mahogany, Mexican.—In the round in 12 to 14 ft. lengths, 1 ft. 3 ins. to 2 ft. 6 ins. in diam.

Black Bark Hickory, Southern United States.—In the round with bark on, in 10 to 18 ft. lengths, 9 ins. to 2 ft. diam.

Pencil Cedar, Florida.—In roughly squared lengths of 6 to 12 ft., 8 to 15 ins. in diam.

Membrilla, Maracaibo.—In the round in 6 to 9 ft. lengths, 6 to 12 ins. in diam. Formerly used for shuttles.

Cocus Wood, Black Ebony of Jamaica, Grenadilla of Cuba, Cocoa Wood of U.S.A.—With bark on, in 3 to 6 ft. lengths, 2½ to 7 ins. in diam.

In addition to the above large quantities of Ash boat oars and Hickory hand-spikes were in stock. These are manufactured in the mills of Messrs. Gardner in the United States.

It may be noted that six or seven hundred tons of Lignum Vitae are generally kept in stock. One large pile of this wood practically ruined by the mycelium of a fungus was observed. Specimens of the injured wood communicated by Messrs. Gardner & Sons have been examined by Mr. G. Massee, and reported upon as follows :—

"The injury is caused by a fungus. The numerous cavities in the wood are filled with mycelium, which primarily passes along the medullary rays.

"The specimen was soaked for some days in water and afterwards kept at a temperature of 80°–90°. This treatment has resulted in

the production of a conidial condition of the parasite developing from the wounds in the wood. The general structure of the mycelium, its mode of attacking the wood, and the conidial form of its fruit, suggest the genus *Polyporus*, but beyond this it is impossible to go."

African Mahogany is well received in both the Liverpool and London Markets. The chief source of supply is the Lagos District, followed closely by Benin. Considerable quantities are also shipped from the Gold Coast and the Ivory Coast; that from the Gold Coast is usually of the smallest average size, generally about 50 cubic feet per log, and the product of the Ivory Coast realises the best prices, although record prices have been reached by logs from the Niger Basin.

Twenty years ago, when the West Indian and Central American Wood was imported in quantity, the West African Wood was ill received, but since the supply of the former has fallen away the consumption of the West African has extensively increased. During 1906, 21 million feet of West African Mahogany were imported into Liverpool alone. A considerable quantity of this was transhipped to the United States, where it is becoming a favourite furniture wood.

Lignum Vitae has been imported in great quantity mostly for the machine makers, as many as 3,000 pieces recently arriving in one week.

At the time of my visit a complete cargo had just come to hand of Japanese Oak and Ash, and was to be offered for public auction. The Oak was in the form of sawn sleepers, but the manufacture seems to be capable of some improvement; notwithstanding this, however, the wood was expected to be well received. It is milder and softer than the American White Oak, with the colour and working properties superior to the American Red Oak. The Ash in the form of hewn logs is very similar in make to that which the market is accustomed to from New Orleans and Baltimore. It appears to be of two varieties, one very clean and white and the other brownish. The former is the harder of the two and appears to be quite equal to the American second-growth Ash which is used by Coach-builders and Agricultural Implement Makers. The brown variety is too dark for the external work in furniture, but being soft and easy to work, should prove useful for inside linings, such as the sides and bottoms of drawers.

A parcel of logs had also just come to hand of Lapacho Wood from the Argentine Republic. There are two varieties of this wood, 'Amarillo' from a yellow-flowered variety and 'Colorado' from the variety bearing pink flowers. The 'Amarillo' is hard and dense and would find a good market here for the spokes of heavy motor wagons, for which purpose it has been tried and found to be entirely successful. It cannot, however, be imported at a price to commend its general use; it realizes, I am informed, from 4*s.* 6*d.* to 5*s.* 6*d.* per foot in Buenos Aires, at which price it would be in competition here with more familiar hardwoods of a similar nature and suitable for the same purposes.

The Argentine has also imported a quantity of Quebracho Colorado; this in its own country is in great request for sleepers,

as it is practically indestructible. It is, however, too hard and too heavy for general purposes; it is also brittle. Its chief value is for the tannin extract prepared from the wood.

North American Hardwoods are in great request principally in the form of sawn boards; in some cases these are imported ready planed to the hand of the user. Satin Walnut is in demand chiefly in the better grades, but the average width of the boards imported is seldom more than 11 inches. The sapwood and diseased trees of the Satin Walnut are imported at a very low price and sold under the name of Hazel Pine, and are principally used for cheap cabinet work and coffins. Bay Poplar or Tupelo Gum has come in in some quantity, but has met with only a poor reception.

In collecting these notes upon timbers the writer was greatly assisted by Mr. Robert Gardner, Mr. Edmund Sergeneson and Mr. James A. Weale.

Economic Collections.—In the Botanic Garden, one of the Public Institutions of the City, the following interesting group of economic plants was observed in addition to those mentioned in the Bulletin previously referred to :—

African Rubbers (*Landolphia owariensis*, *L. florida* and *Funtumia elastica*).

Ipecacuanha (*Psychotria Ipecacuanha*).

Sierra Leone Copal (*Copaifera Guibourtiana*).

Croton (*Croton Tiglium*).

Cola (*Cola acuminata*).

Bay Berry (*Pimenta acris*).

Avocado Pear (*Persea gratissima*).

Lignum Vitae (*Guaiacum officinale*).

Coca (*Erythroxylon Coca*).

Cinnamon (*Cinnamomum zeylanicum*).

Miraculous Berry (*Sideroxylon dulcificum*).

Oil Palm (*Elaeis guineensis*).

Tamarind (*Tamarindus indica*).

Bowstring Hemp (*Sansevieria zeylanica*).

Sugar Cane (*Saccharum officinarum*).

Para Rubber (*Hevea brasiliensis*).

Sweet Cassava (*Manihot palmata*).

Mammee Apple (*Mammea americana*).

Cherimoyer (*Anona Cherimolia*).

Mahogany (*Swietenia Mahagoni*).

Red Cinchona (*Cinchona succirubra*).

Baobab (*Adansonia digitata*).

Mango (*Mangifera indica*).

Granadilla (*Passiflora quadrangularis*); in fruit.

Vanilla (*Vanilla planifolia*); in fruit.

Under the care of Dr. Eric Drabble, F.L.S., the Museum of Economic Products at the Hartley Laboratories, Liverpool University, is developing. The bulk of the products from the Tropical Products Exhibition held in Liverpool during September last has been reserved for permanent exhibition in one of the Museums of the City.

In shops in the City the following were on sale :—Persimmons the fruits of *Diospyros Kaki*; Custard Apples (*Anona reticulata*); Avocado Pears (*Persea gratissima*); Green Corn Cobs (*Zea Mays*), Chufas, the tubers of *Cyperus esculentus*; and "South of England Mushrooms" (*Clitocybe nebularis*).

XXV.—THE TIMBERS OF SOUTHERN NIGERIA.

Mr. H. N. Thompson, Conservator of Forests, Southern Nigeria, has drawn up and sent to Kew a list of the chief timbers exported from Southern Nigeria. Descriptive notes on the gardens and plantations, together with lists (compiled by the Curators and Provincial Forest Officers) of the plants grown in them and of the economic plants of this region, have also been forwarded by Mr. Thompson.

The present article consists of Mr. Thompson's list of the timbers of Southern Nigeria, with which additional details, taken from Mr. A. H. Unwin's list of indigenous plants of economic importance, have been incorporated. In some cases Mr. Unwin's notes only supplement Mr. Thompson's account of a particular tree, whilst in others he deals with a timber not otherwise referred to.

(1.) Mahoganies of the genus *Khaya*, known to the Benis as "Gadeau" or "Ogwangu." There are three species found in these forests, viz.: *Khaya senegalensis*, R. Juss., *Khaya grandifolia*, Stapf, and *Khaya Punchii*, Stapf, the latter being apparently confined to areas that are under water for several months of the year. The timbers of these species are much in demand at home and have realized very good prices during the year. They are generally known in the trade as "Benin Mahogany."

(2.) Mahoganies of the genus *Entandophragma*, one identified species of which, viz.: *Entandophragma Candollei*, Harms, is known to the Benis as "Ikpwapobo." It is the "unscented," long capsuled mahogany and furnishes a higher percentage of "figured" logs than the other species. The timber from the tree had a bad name in the Liverpool Market, in 1904–05, as it was said to be rather "gummy," and difficult to cut into thin pieces for veneering purposes. However, since the system of girdling the trees and thus allowing them to die off gradually and become properly seasoned was adopted (on the advice of this Department) the wood has regained its good name and realised higher average prices during 1906 than *Khaya* timber.

It is most plentiful in the drainage areas of the Jamieson and Ethiope rivers of the Central Province, and is always found on high land.

The tree is usually very large, up to 50 ft. girth, very straight, and with very slight root phlanges. The value of the timber is about 3*d.* to 4*d.* per superficial foot.

(3) Mahoganies of the genus *Pseudocedrela.*—There appear to be at least two unidentified species of the genus found in Southern Nigeria. The one generally exploited is known to the Benis as "Onomokyukyu" and in the Liverpool Market as "Sapeli Mahogany." Since the "girdling" method of seasoning the timber was adopted it has been sold in Europe at very good prices. The timber is scented like Cedar and the tree has a long capsule similar to that of the *Entandophragma.* This species is perhaps most plentiful in the well-wooded valleys of the hinterland ; in the moist zone it is confined to high dry ground. The timber of another species of *Pseudocedrela*, known to the Benis as "Apobo," and as "African Walnut" in the trade, is also exported to Europe.

This "African Walnut," "Anamammilla" (Benin), "Apobo" (Jekri), realises usually about 2*d.* to 3*d.* per foot. It is found all over the western part of the Central Province. The tree is of large size, up to 18 ft. in girth, and not too branching. It appears outwardly very much like mahogany at times, owing to the similar root growth. The grain is close, and of a rich walnut brown colour. Neither seeds nor seedlings have yet been seen. The tree grows on moist deep soil, and especially on southern slopes.

(4.) Timbers furnished by various species of *Guarea*, only one of which, *Guarea Thompsonii*, Sprague and Hutchinson, has so far been named. The two kinds exported to Europe are known by the Benis as "Obobonikwi" and "Obobonufwa." They have been exported to Europe under the general trade name of "Cedar Benin Mahogany." The species of *Guarea* appear to be confined to the moist evergreen forests.

Mr. Unwin writes that "Obobonufwa" (*Guarea* or *Heckeldora*) has been shipped several times and realized 2½*d.* to 4*d.* per superficial foot, and has been classified by the timber brokers as mahogany "scented." Recently not so much in demand. It is found over the larger part of the Central Province, and grows to a large size, up to 20 ft. in girth. The stem is grey in colour and pitted with indentures, where the bark peels off. Office furniture at Benin City is made entirely of this wood.

"Obobonikwi," *Heckeldora* sp. nov., worth 3*d.* to 6*d.* per foot, of late, however, it has not been fetching more than 2*d.* The wood is of a dark rich red-brown colour, of close texture, taking a good surface when planed. This tree is found over the western part of the Central Province, growing in similar localities to the mahogany, and attaining a girth of 18–20 ft. with corresponding height. It fruits readily, and the seeds germinate and develop rapidly.

All the above-mentioned plants belong to the natural order *Meliaceae*, which also includes the Honduras or true American mahoganies and cedars of the genera *Swietenia* and *Cedrela*,

The following species should also be exploited, as they have been favourably reported on by timber brokers at home.

(5.) The "Okwen" of the Benis, or *Ricinodendron africanus*, Muell. Arg., belongs to the natural order *Euphorbiaceae*. The timber has been described as that of a "species of mahogany" and declared to be suitable for the European market. It is very common in the evergreen forests of this country, but does not reach such large dimensions as some of the Khayas and Entandophragmas.

(6.) The "Ainyesan," a yellow satinwood that has fetched as much as 6½*d.* per superficial foot at Liverpool. The timber however is of uncertain quality and only picked pieces have realized that price. It is fairly plentiful in the Benin districts.

(7.) The "Ugo" of the Benis, "Atalla" of the Jekris, another unidentified species, is a good deal heavier than the Benin Wood. The seeds, when over-ripe, have the scent of phosphorus, but are not luminous. The timber is hard and close grained, of the usual red mahogany colour. It is found in the Warri and Sapeli districts chiefly, but also near Ukumo in the Benin City district, growing on a damp to wet soil. This tree attains a large size, up to 16 ft. girth, and is moderately straight. It has been reported on as a mahogany of mild texture and fairly good colour, and valued at 3*d.* to 6*d.* per superficial foot.

(8.) The "Nikiba," of the Benis, described as "a species of gummy mahogany," valued at from 2½*d.* to 3½*d.* per superficial foot. The botanical name is not yet known.

(9.) The "Aganokwi" (?), *Mimusops multinervis*, Baker, is a tree yielding a good rich-coloured hardwood resembling mahogany; it is frequently figured, and should command a ready sale in Europe. It is known as "Bakum Mahogany," and is very widely distributed throughout the Central Province, but is of smaller growth than in the Benin City district, where it attains a height of 120 ft. and 40 ft. girth. It grows on high as well as on low land, but the development of the tree near the swamps of the Niger is very poor, and the trees do not attain a large size. Value 2½*d.* to 4*d.* per foot.

The species is very plentiful in some of the moist evergreen forests of the Protectorate and has a tendency to grow gregariously. It has been exported home under the general trade name of mahogany.

(10.) The "Arachi", *Afzelia africana*, Sm., is another tree which yields an excellent hard wood. It is quite plentiful in parts of the Onitsha district and again in the mixed forests of the Western Province. It is largely used in the Central Province for furniture and building purposes.

(11.) The "Eba," or red iron-wood tree. This appears to be a species of *Lophira*, and unlike its congener *Lophira alata*, Banks, of the dry open forests, is confined to the fresh water swamps of the moist zone, where it is plentiful, more especially in parts of the Benin City district. The wood is very hard,

It is most plentiful in the drainage areas of the Jamieson and Ethiope rivers of the Central Province, and is always found on high land.

The tree is usually very large, up to 50 ft. girth, very straight, and with very slight root phlanges. The value of the timber is about 3*d.* to 4*d.* per superficial foot.

(3) Mahoganies of the genus *Pseudocedrela*.—There appear to be at least two unidentified species of the genus found in Southern Nigeria. The one generally exploited is known to the Benis as "Onomokyukyu" and in the Liverpool Market as "Sapeli Mahogany." Since the "girdling" method of seasoning the timber was adopted it has been sold in Europe at very good prices. The timber is scented like Cedar and the tree has a long capsule similar to that of the *Entandophragma*. This species is perhaps most plentiful in the well-wooded valleys of the hinterland; in the moist zone it is confined to high dry ground. The timber of another species of *Pseudocedrela*, known to the Benis as "Apobo," and as "African Walnut" in the trade, is also exported to Europe.

This "African Walnut," "Anamammilla" (Benin), "Apobo" (Jekri), realises usually about 2*d.* to 3*d.* per foot. It is found all over the western part of the Central Province. The tree is of large size, up to 18 ft. in girth, and not too branching. It appears outwardly very much like mahogany at times, owing to the similar root growth. The grain is close, and of a rich walnut brown colour. Neither seeds nor seedlings have yet been seen. The tree grows on moist deep soil, and especially on southern slopes.

(4.) Timbers furnished by various species of *Guarea*, only one of which, *Guarea Thompsonii*, Sprague and Hutchinson, has so far been named. The two kinds exported to Europe are known by the Benis as "Obobonikwi" and "Obobonufwa." They have been exported to Europe under the general trade name of "Cedar Benin Mahogany." The species of *Guarea* appear to be confined to the moist evergreen forests.

Mr. Unwin writes that "Obobonufwa" (*Guarea* or *Heckeldora*) has been shipped several times and realized 2½*d.* to 4*d.* per superficial foot, and has been classified by the timber brokers as mahogany "scented." Recently not so much in demand. It is found over the larger part of the Central Province, and grows to a large size, up to 20 ft. in girth. The stem is grey in colour and pitted with indentures, where the bark peels off. Office furniture at Benin City is made entirely of this wood.

"Obobonikwi," *Heckeldora* sp. nov., worth 3*d.* to 6*d.* per foot, of late, however, it has not been fetching more than 2*d.* The wood is of a dark rich red-brown colour, of close texture, taking a good surface when planed. This tree is found over the western part of the Central Province, growing in similar localities to the mahogany, and attaining a girth of 18–20 ft. with corresponding height. It fruits readily, and the seeds germinate and develop rapidly.

All the above-mentioned plants belong to the natural order *Meliaceae*, which also includes the Honduras or true American mahoganies and cedars of the genera *Swietenia* and *Cedrela*,

The following species should also be exploited, as they have been favourably reported on by timber brokers at home.

(5.) The "Okwen" of the Benis, or *Ricinodendron africanus*, Muell. Arg., belongs to the natural order *Euphorbiaceae*. The timber has been described as that of a "species of mahogany" and declared to be suitable for the European market. It is very common in the evergreen forests of this country, but does not reach such large dimensions as some of the Khayas and Entandophragmas.

(6.) The "Ainyesan," a yellow satinwood that has fetched as much as 6½*d.* per superficial foot at Liverpool. The timber however is of uncertain quality and only picked pieces have realized that price. It is fairly plentiful in the Benin districts.

(7.) The "Ugo" of the Benis, "Atalla" of the Jekris, another unidentified species, is a good deal heavier than the Benin Wood. The seeds, when over-ripe, have the scent of phosphorus, but are not luminous. The timber is hard and close grained, of the usual red mahogany colour. It is found in the Warri and Sapeli districts chiefly, but also near Ukumo in the Benin City district, growing on a damp to wet soil. This tree attains a large size, up to 16 ft. girth, and is moderately straight. It has been reported on as a mahogany of mild texture and fairly good colour, and valued at 3*d.* to 6*d.* per superficial foot.

(8.) The "Nikiba," of the Benis, described as "a species of gummy mahogany," valued at from 2½*d.* to 3½*d.* per superficial foot. The botanical name is not yet known.

(9.) The "Aganokwi" (?), *Mimusops multinervis*, Baker, is a tree yielding a good rich-coloured hardwood resembling mahogany; it is frequently figured, and should command a ready sale in Europe. It is known as "Bakum Mahogany," and is very widely distributed throughout the Central Province, but is of smaller growth than in the Benin City district, where it attains a height of 120 ft. and 40 ft. girth. It grows on high as well as on low land, but the development of the tree near the swamps of the Niger is very poor, and the trees do not attain a large size. Value 2½*d.* to 4*d.* per foot.

The species is very plentiful in some of the moist evergreen forests of the Protectorate and has a tendency to grow gregariously. It has been exported home under the general trade name of mahogany.

(10.) The "Arachi", *Afzelia africana*, Sm., is another tree which yields an excellent hard wood. It is quite plentiful in parts of the Onitsha district and again in the mixed forests of the Western Province. It is largely used in the Central Province for furniture and building purposes.

(11.) The "Eba," or red iron-wood tree. This appears to be a species of *Lophira*, and unlike its congener *Lophira alata*, Banks, of the dry open forests, is confined to the fresh water swamps of the moist zone, where it is plentiful, more especially in parts of the Benin City district. The wood is very hard,

close grained and heavy, and is said to resist the attacks of both white ants (*Termites*) and the Teredo worm. It should prove suitable for all purposes where strength and great durability are required. The wood is, however, rather difficult to work. Experiments are being undertaken with a view to ascertaining its suitability for railway sleepers.

It attains a large size, up to 20 ft. in girth, with straight stem and few branches, on the moist low lands, and is usually found in company with real mahogany, and very few other trees. A deep and moist soil is required, but with drainage this tree develops rapidly as a seedling.

(12.) The "Odonomokyukyu," of the Benis, a species of *Santiriopsis*, probably *Santiriopsis Klaineana*, Pierre (?), is common in the evergreen forests of this country. The wood is much valued in the French and Belgian Congo, and is sometimes exported to Europe.

(13.) *Detarium senegalensis*, J. F. Gmel., is a magnificent lofty leguminous tree, the wood of which has been exported in past years to Liverpool under the trade name of "African Mahogany." It is confined to the evergreen forests and is rather uncommon.

(14.) The "Agba," of the Benis, an unidentified tree with a light-coloured wood, which has also been exported from the Benin district as a kind of mahogany. It is fairly common in some districts of the Central Province.

(15.) The "Iroko", *Chlorophora excelsa*, Benth., is one of the best timber trees of West Africa. It is most plentiful north of the evergreen belt, and its wood is extensively used on the coast for making furniture and for building purposes. The timber is very durable, hard and of a yellowish colour when fresh, but rapidly darkens to a rich brown and becomes almost black. The grain is straight, though a little fibrous at times. The tree grows in a deep and somewhat moist soil, avoiding a dry one, and the natives say that its roots must reach running water. The value is 2*d.* per foot. Seed has not yet been collected, but small seedlings are often seen and apparently develop quickly. It grows to a very large size ;—the great "Juju" tree everywhere—and sometimes attains a girth of 30 ft. though only 80 to 90 ft. in height.

(16.) The "Camwood" of Southern Nigeria is procured from two species of leguminous trees, viz.; *Baphia nitida*, Lodd., and *Pterocarpus tinctorius*, Welw. ; the latter is a large tree which is confined to the moist evergreen forests.

Baphia nitida is rather inclined to be shrubby and appears to be extensively cultivated round villages. I do not think that it is found growing wild in the forests in any large numbers.

(17.) "Padouk," "Ume," "Barwood," *Pterocarpus tinctorius?* has a rich red wood, which fetched £10 per ton when the market happened to be good, but subsequent shipments have reduced the price. It has not been sent since February, 1905. The natives use it as a dye-wood, exporting it especially to Lagos. Trees to be thus used are usually felled some years before the

timber is split up into the little pieces, which they sell at so much the basket load, 3*d.* to 6*d.* The tree is common and is found all over the Central Province; it grows chiefly on the lower-lying land and attains a girth of 9 ft. as a maximum.

There are two other hardwood trees, found in the moist evergreen forests of the eastern portion of the Western Province and the southern portions of the Central Province, that deserve mention. They belong to the genus *Piptadenia* and attain large dimensions. The timbers of both are excessively hard and almost indestructible, as they resist attacks from insects. The larger species "Okan" of the Benis is known locally as the African "Greenheart" and is used for house construction. The wood, however, is exceedingly hard and difficult to work, and is consequently not so frequently employed as some of the softer and less durable kinds. The other species appears to be *Piptadenia africana*, Hook. It is known to the Benis as the "Ikhimi." The wood is much lighter in colour than that of the "Okan," but is just as durable.

Of softwood trees there appears to be only one species that is likely to furnish timber suitable for the home market or to replace locally the large quantities of pitch pine imported from Europe. The timber is fairly close grained, light coloured, easy to work and very durable. It has been extensively used by the Public Works Department for building purposes along the Niger. The tree is either a species of *Sterculia* or *Cola* and has not yet been identified botanically. It reaches large dimensions, is fairly common, and has a tendency to grow gregariously; the natural regeneration is also good, and if the timber ever comes into general demand there will not only be a large supply immediately available, but it will be a comparatively easy matter to get the age gradations into a more or less normal state for future demands.

An unnamed species of *Terminalia*, common in the mixed forests of the Central and Western Provinces, is also likely to furnish timber suitable for the home markets. It is a tree of lofty growth and exceptionally good "form figure," the girth being well maintained up to a great height. The Yoruba name of the tree is "Epepe."

Ebonies.—The Ebony exported from Southern Nigeria is furnished by two species of *Diospyros*, viz., *Diospyros mespiliformis*, Hochst., of the mixed forests, and *Diospyros Dendo*, Welw., of the evergreen forests. The former is still fairly plentiful, but the majority of the large trees belonging to the latter species have been practically exhausted in the drainage areas of the Calabar and Cross rivers, from which the bulk of the Southern Nigerian Ebony used to be exported. The natives have now taken to felling immature trees of this species, and the supply of large billets suitable for the home markets will rapidly diminish in the near future.

The following additional notes have been taken from Mr. A. H. Unwin's list of the timbers of the Central Province, and refer to timber not mentioned by Mr. Thompson.

Cedar or Mahogany, "Ibegogo," *Carapa procera* (?) has only once been shipped home, and was then valued at 2½*d.* to 3½*d.* per foot as a timber with some of the qualities of both cedar and mahogany. It is very prevalent all over the Province, but is not always a very straight or tall tree, and branches rather low down. It attains a girth of 9–12 ft., and a height of 50-60 ft. Seeds are produced very freely and too early for the good of the tree.

Ebony, "Isinewey," (*Diospyros* ?). Timber from this tree was sent home and classified as mahogany with a value of 2*d.* to 3½*d.* per foot, but as far as the tree is known here, it appears to be an ebony. The wood is hard and reddish brown. This tree is very prevalent all over the western side of the Province, but does not usually attain a very large size and is only moderately straight in growth.

"Ughahan," "Sabicu," (?) *Zanthoxylum senegalense*, DC., is mentioned in the Liverpool Market as worth 2*d.* to 2½*d.* per foot, and is classified as mahogany though botanically it belongs to the Satinwood group. It is common all over the Province, and is found very often on old farms, as the seedlings appear to be light demanding. Wood very varied in texture and in colour, which is sometimes yellowish brown to dark brown. The tree grows to a fair size, 9–12 ft. in girth, and straight up to 80 ft. in height. The stem is covered with prickles even up to old age.

African Ebony, "Igidudu," *Diospyros atropurpurea*, Guerke. Sampled in 1905, and sold as Ebony with a value of £5 to £10 per ton. It is found all over the Province, especially near the Niger on the left bank, but owing to the waterlogged nature of the ground it does not attain a large size, 24 ft. being the largest yet seen by the Department, and of corresponding height. It grows on moist soil of good depth ; only a few large trees are found in the western part of the Province.

Greenheart, "Ogwega," "Furniture wood," "Oak," *Dialium guineense* (?). With the above names this timber tree has been designated, with a price varying from 1½*d.* as greenheart to 3*d.* as oak, but it has not been cut since. The tree is very common all over the western portion of the Province and occurs on fairly high land, and good soil, where it fruits readily. The wood is of a rich, red-brown colour, and the grain is rather varied from fibrous to very close. The tree grows to a large size and is moderately straight.

"Oak," "Awaw" (Benin), "Erumacie" (Benin), *Lonchocarpus* sp., near *Zenkeri*, Taub. This was classified as an oak timber, when samples were sent home, with a value of 2*d.* per foot, but has not been cut since then. The tree grows all over the Province, and attains a medium size ; it requires good loam soil. The wood is reddish-brown in colour with close to fibrous grain.

"Padouk," "Akume," *Pterocarpus* sp., has only thus far been sent as a sample ; it was valued at 2*d.* to 3½*d.* per foot, but has not been cut since. It is very prevalent all through the Province, both on the higher-lying as well as the low-lying land, and seems to do pretty well on both. The tree does not attain to a very

large size, 8–9 ft. girth being about the maximum, but the growth is straight and there are only a few branches low down. The wood is a good red colour, which pales on the surface on exposure to the air for any length of time. The natives use it as a red dye-wood, and it is sold in all the local markets even for sending to Northern Nigeria.

"Satinwood," "Obeche," *Hibiscus* (*Triplochiton*) n. sp. A valuation of 2¾*d.* to 1*s.* per foot was given for a sample of this wood at the Liverpool Market, where it was classified as Satinwood. None has been cut since then. It is a very common tree, being found in many localities, and in very large examples up to 25 ft. in girth. The leaf is very much like that of an English Maple. The tree grows on high land with a good soil.

"Satinwood," "Anyairhan," *Leguminosae.* At first when this was sampled the prices varied from 1½*d.* to 1*s.* per foot, but latterly they were 2*d.* to 4*d.*, and the timber was not so well spoken of as at first. Altogether three lots of samples have been sent. Apparently it would gradually gain a position in the market. It is quite common in the Province, and attains a large size with good length of bole; 18 ft. would be the maximum stem girth. The tree grows in rich soil, of considerable depth. The stem is a brilliant red colour and the bark gradually peels off in long strips each year. The wood which is very hard and has a yellowish-green tint is close grained and works up very smooth.

XXVI.—MISCELLANEOUS NOTES.

Mr. Robert Fyffe, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Assistant to the Superintendent of the Botanic, Forestry and Scientific Department of the Uganda Protectorate.

Mr. Frank Reginald Long, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Superintendent of the Government Plantations in the Federated Malay States.

Mr. W. R. Elliott.—It is with great regret that we record the death of Mr. W. R. Elliott, Forestry Officer for Northern Nigeria. He died on March 13th, at Bedford, and leaves a wife and young family. He was 48 years of age. Mr. Elliott left Kew in 1881 and was at the Botanic Gardens, Jamaica, until 1886 as Superintendent of the Parade and King's House Gardens. From March, 1886, until April, 1889, he was Curator of the Botanic Garden at Grenada, and afterwards became Collector to the West Indian Natural History Exploration Committee. After holding various other posts in the West Indies, he was appointed Forestry Officer in Northern Nigeria in 1903 (*K. B.* 1903,

p. 31). In 1907 Mr. Elliott was invalided home from Nigeria owing to a serious illness. He appeared to have made a complete recovery, and was reported as fit to return to duty. On the 6th of March, however, he fell ill with influenza, followed by double pneumonia, which proved fatal.

Botanical Magazine for March.—The plants figured are *Sinningia Regina*, Sprague, *Cypripedium debile*, Reichb., *Pyrus Aria*, Ehrh., var. *majestica*, Prain, *Berberis acuminata*, Franch., and *Rosa Willmottiae*, Hemsl. The *Sinningia* was introduced as a chance seedling from Brazil by Mr. de Smet-Duvivier, of Ghent, and under the name of *Gesneria Reginae* was exhibited in flower at the Ghent Quinquennial Exhibition of 1903. It is an ornamental plant both on account of its leaves and its large pale violet flowers. The Kew plants were raised from seed distributed by Messrs. Benary, of Erfurt. *Cypripedium debile* is a curious little plant with small, pale green and white flowers slightly marked with brown and purple. It is a native of Japan and is found also in several localities in Western China. In this country it may be grown out of doors. Roots were purchased for Kew from the Yokohama Nursery Company. The variety of the handsome *Pyrus Aria*, which is distinguished by its larger leaves and flowers, is believed to be of garden origin. The material figured was obtained from a tree which has been cultivated for many years in the Kew Arboretum. *Berberis acuminata* is a native of Yunnan and Western Hupeh, China, and has been introduced into cultivation by Messrs. James Veitch & Sons, who supplied the material for the drawing. It is allied to *B. Wallichiana*, DC., but has narrower and more acute or acuminate leaves, with more numerous, longer, and more spiny teeth. The flowers are bright yellow and are borne in fascicles of 2 to 15. *Rosa Willmottiae* is an exceedingly pretty species belonging to the section *Cinnamomeae*, and was described first in the *Kew Bulletin*, 1907, p. 317. It was raised by Messrs. James Veitch & Sons from seeds collected for them by Mr. E. H. Wilson, in the Sangpan mountains, near the Tibetan frontier of Western China, at elevations of 9,500 to 11,000 feet. Its nearest ally is *R. Webbiana*, Wall.

Botanical Magazine for April.—The following plants are figured and described: *Bulbophyllum Binnendijkii*, J. J. Smith; *Kaempferia Kirkii*, K. Schum., var. *elatior*, Stapf; *Saxifraga Brunoniana*, Wall., *Rheum inopinatum*, Prain; and *Olearia ciliata*, F. Muell. The very striking *Bulbophyllum* is a native of Java, and differs from *B. Ericssoni*, Kraenzl., in being larger in almost all its parts. Messrs. F. Sander & Sons, who grew the plant from which the drawing was made, exhibited it at last year's Temple Show under the name of *B. Ericssoni*, and the question is not yet decided whether or not the two species should be considered identical. The beautiful *Kaempferia* was drawn from specimens presented by Mr. H. J. Elwes, F.R.S., who obtained the plant from the neighbourhood of Salisbury, Rhodesia. It is

taller-growing than typical *K. Kirkii*, the leaves are longer and narrower, and the yellow blotch at the throat of the flower is bordered on both sides with purple. *Saxifraga Brunoniana* is a pretty and curious species from the Himalaya, where it ranges from Sikkim to Kashmir at elevations of 9,000 to 13,000 feet. It has long slender stolons, which, with the stems, are bright crimson, and small yellow flowers. The Kew plants were raised from seeds received from the Royal Botanic Gardens, Calcutta, in 1903. *Rheum inopinatum* is a new species belonging to the section *Deserticolae*, in which the stems are leafless, or nearly so, and the leaves firm. It is a small-growing plant, with grey-green leaves, and a bright red or crimson inflorescence. Seeds were presented to Kew in 1905 by the Director of the Botanical Survey of India, having been collected at Gyantse in Tibet by Capt. H. J. Walton in 1904, during the Tibet Mission. The *Olearia* is a native of Australia and Tasmania, and resembles some of the species of *Aster* and *Felicia*. The plant figured was raised from seeds received in 1899 from Sergt. Goady, R.E., of Albany, Western Australia.

The South African Locust Fungus.—During the years 1895–96 locusts killed by a fungus were collected in Natal. The fungus was determined to be *Entomophthora Grylli*, Fres., a parasite previously known to be destructive to grasshoppers. In the hope of reducing the devastating hordes of locusts abounding in South Africa, attempts at its cultivation were made at the Grahamstown Bacteriological Institute, from material obtained from the infected Natal locusts. Unfortunately this attempt did not prove a success, as *Entomophthora Grylli*, Fres., was almost invariably absent from the cultures, and when present was dead as would be expected, considering the fact that this fungus can only grow in the body of a living insect. The material cultivated and distributed in a wholesale manner consisted of two distinct species of fungi, *Rhizopus nigricans*, Ehr., being alone present in the tubes of material examined by Professor McAlpine in Melbourne, whereas the material submitted to Kew for examination proved to be a pure culture of a fungus not previously described, and was called *Mucor exitiosus*, Mass. (*Kew Bulletin*, 1901, p. 94).

Material received by Mr. Hart, in Trinidad, consisted mainly of *Mucor exitiosus*, along with a sprinkling of dead *Entomophthora Grylli*.

On the whole, *Mucor exitiosus* was the most constant and abundant fungus present in the cultures.

Rhizopus nigricans is a widely distributed species, but has no injurious action on living insects.

Mucor exitiosus has not been proved to attack either grasshoppers or locusts, in fact all evidence forthcoming is decidedly opposed to this view. Soon after the "locust fungus" preparation was issued, it was subjected to a thorough examination at the Colorado Experiment Station, United States, and as the result of

numerous experiments conducted on scientific principles, it proved an utter failure, the locusts that died during the experiments being found to have succumbed to the feral form of *Entomophthora Grylli*, and not to *Mucor exitiosus*.

Exactly similar conclusions have recently been arrived at independently by Dr. Butler in India, and by Mr. I. B. Pole Evans in the Transvaal, after experimenting with the "locust fungus."

From the above account it is evident that the "locust fungus," from which so much was expected, is of no value as an exterminator of locusts, and as *Entomophthora Grylli* cannot be cultivated artificially its action is limited and uncertain, yet it appears highly probable that in those cases of reported success following the use of the "locust fungus" preparation, the amount of such success depended in reality on the action of the last-named fungus.

Quite recently Mr. W. S. Marais, of De Poort, De Aar, has recorded a successful method of destroying locusts wholesale, by the use of arsenite of soda and sugar. One pound of arsenite of soda and four pounds of sugar are dissolved in five gallons of water in a ten gallon drum. Green grass (osgras and klitgras) is then taken and cut up very fine, into pieces not more than an inch long, and the drum is filled with it. The mixture is allowed to soak during the night, and in the early morning it should be spread very thinly round the bushes on which the locusts are sleeping. They begin to feed directly they move, and the swarms are completely destroyed. The grass should be spread so thinly that stock cannot pick it up, and what the locusts leave is soon dried up in the sun.

The above amount was used for locusts in the hopper stage, and where more advanced, two pounds of arsenite of soda and eight pounds of sugar should be used with the same amount of water as given above.

Mr. H. Maxwell-Lefroy points out that a wide bag on a frame is used extensively in India for the destruction of the hoppers of the Bombay Locust. The bag is run through the field fairly rapidly. At the end of each run the bag is twisted up and the insects shaken into a corner and destroyed.

The use of a bag net is also recommended as one of the methods for exterminating locusts in the Caucasus, and an account of the instructions issued for dealing with the pest in that region is given in the *Kew Bulletin*, 1894, p. 215.

Mr. I. B. Pole Evans' paper on the South African locust fungus has been reprinted as a leaflet (No. 5) from the *Transvaal Agricultural Journal*.

G. M.

The accompanying plate reproduced from a photograph taken in Nyasaland gives some idea of the ravages caused by a plague of locusts.

Trees and bushes covered by a swarm of Locusts. From a photograph taken in Nyasaland.

To face page 198.

New Rubber-containing Plants.—Rubber (including gutta-percha) is known to occur in about a dozen familes of plants, of which the more important are the *Euphorbiaceae*, *Urticaceae* (*Moraceae*), *Apocynaceae*, *Asclepiadaceae* and *Sapotaceae*, whilst the *Loranthaceae* and *Compositae* will probably also become of considerable importance in the near future (see *Tropenpflanzer*, 1905, p. 633 ; and *Kew Bull.*, 1906, p. 218 ; 1907, p. 285). In the remaining five families the occurrence of rubber is at present a matter of theoretical interest only, as it has not yet been shown that its extraction would be remunerative ; they are the *Trochodendraceae* (*Eucommia*), *Tiliaceae* (*Plagiopteron*), *Celastraceae*, *Hippocrateaceae* and *Lobeliaceae* (*Siphocampylus*), whilst a sixth, *Convolvulaceae*, is given by Czapek as also containing rubber (*Biochemie*, vol. ii, p. 709).

The presence of rubber in three African species of *Gymnosporia* (*Celastraceae*) is recorded in the *Notizblatt des Königl. botanischen Gartens und Museums zu Berlin*, No. 42 (Bd. V.), of March 11th, 1908, by Dr. Th. Loesener, who prefaces his account by a summary of our knowledge of the occurrence of rubber in the family.

Radlkofer, who was the first to detect rubber in the *Celastraceae*, found it in the Mexican genus *Wimmeria* (*Bot. Gaz.* vol. xviii., 1893, p. 199). The leaf anatomy of the *Celastraceae* was afterwards investigated with special reference to the occurrence of rubber by Metz, who recorded its presence in special laticiferous cells of the leaves in eight species of *Wimmeria* and in the South African *Mystroxylon eucleaeforme*, whilst in no fewer than thirteen genera, rubber was present in the form of small masses in the cells of the parenchyma (*Beih. Bot. Centralbl.* vol. xv., p. 309) ; in some of these genera however, the rubber may have been present in laticiferous cells in the stem and root, although not occurring in special cells in the leaves ; this was found to be the case in *Euonymus*, for example, by Col (*Comptes Rendus*, vol. cxxxii., 1901, p. 1,354).

It is obvious that the extraction of rubber could not be profitably undertaken, where it is present merely in the cells of the parenchyma. In the three species of *Gymnosporia* investigated by Loesener, however, the rubber is present in special laticiferous cells, which occur in the bark, the leaves and the inflorescence, but it is still unknown whether the rubber is of sufficiently good quality and present in sufficient amount to make its extraction profitable. Further information is also required as to the geographical distribution of the three species and their mode of occurrence, before an opinion can be formed as to the value of Loesener's discovery. The presence of the rubber may be detected by carefully breaking in two a leaf or a piece of bark, when the portions remain connected by fine elastic threads which stretch from one broken surface to the other and which can be drawn out for a fair distance before breaking, when they rebound and curl up.

The three species, which are closely allied to one another, are all spineless and are natives of intertropical East Africa. Two of them, *G. amaniensis*, Loes., and *G. bukobina*, Loes., are new

species, of which the descriptions will appear in the forthcoming part of *Engler's Botanische Jahrbücher*, vol. XL., now in the press : and the third, which was described by Loesener in 1893 as a new species, *G. lepidota*, Loes. (*Engl. Bot. Jahrb.* vol. xvii., p. 549), is now regarded by him as a variety of the common and polymorphic *G. acuminata*, Szysz., a native of South Africa.

G. amaniensis was collected by Warnecke in the neighbourhood of Amani, East Usambara, at an altitude of about 2,700 feet, and is described as a relatively slender tree, attaining a height of 100 feet. *G. bukobina*, on the other hand, appears to be a climber ; it was discovered in 1903 by P. Conrads not far from Bukoba, to the West of Victoria Nyanza, at about 4,000 feet. *G. lepidota* seems to be more widely distributed than the other two, even if we regard it as distinct from *G. acuminata*, having been recorded from Mts. Ruwenzori, Kilimanjaro and Mawensi, and from the Uluguru Mountains in Ukami, at altitudes varying from 7,000 to 11,000 feet above sea level. According to Loesener it is a tree about 33 feet high, but Dawe, who collected it on Ruwenzori at about 11,000 feet describes it as a shrub 10 feet high, and no doubt the height varies according to the altitude and exposure. In the Uluguru Mountains the tree is called "Mbamala" by the natives, according to Goetze. T.A.S.

Botanic Gardens, Olokemeji, Southern Nigeria.—These gardens were formed in 1901 to take the place of those at Ebute-Metta on the partial appropriation of the latter for other purposes. The ornamental portion of the gardens, together with the arboretum, comprises about 4⅛ acres, but the garden proper consists of 156 acres laid out in plots, edged with grass verges, and each plot is, as far as possible, devoted to products of a like kind, such as Fibre, Fruit, Rubber, &c.

The fibre plot contains *Boehmeria nivea*, *Urena lobata*, *Sansevieria guineensis*, *Furcraea gigantea*, *Agave rigida*, var. *sisalana*, *Hibiscus esculentus*, all of which give good results.

Of fruit, specimen trees of Mango, Pitanga cherry, *Anacardium*, Guava, *Zizyphus*, Pomegranate, *Anona* sp., *Achras Sapota*, *Artocarpus integrifolia*, and various members of the *Citrus* family such as Citron, Orange, Lime, Grape-fruit, Shaddock, etc., are established and are valuable in furnishing seeds, from which plants are raised for distribution. Pineapples are grown in large quantities to furnish suckers for distribution, and grow with remarkable freedom, plants fruiting twelve months after being planted.

A plot of *Coffea liberica* and one of *Coffea arabica* are giving good results. Cacao is almost a failure in this district owing to insufficient rainfall.

The plot devoted to rubber contains *Landolphia owariensis*, *L. florida*, *L. Thompsonii* and *Funtumia elastica*, the latter a demonstration plot grown entirely in the open. A number of Para rubber trees planted in 1902 are well established, but are not a great success in this part of the country.

Specimens of timber trees are growing in different parts of the garden including *Tectona grandis*, *Cedrela odorata*, *Swietenia Mahagoni* and the indigenous *Chlorophora excelsa*, *Diospyros mespiliformis* and *Mimusops multinervis*.

A plantation of *Cocos nucifera* planted in 1902 close to the river is well established.

Poinciana regia, *Terminalia Catappa*, *Albizzia Lebbek*, and *Hura crepitans* are grown as shade trees, and plants raised in the gardens are being planted extensively in the streets of towns and at all railway stations.

A considerable portion of the garden is devoted to raising plants for distribution and is laid out in seed beds ; Kola, Cacao, and Para rubber are raised in large quantities, 15,000 seeds of Kola, and 38,000 Para seeds being imported for raising plants for distribution during the current year.

Twenty-six acres of land are devoted to growing farm crops. Experiments are being conducted with a view to improving the native yam, and for this purpose eight different varieties have been planted this year.

Experiments in Cotton are conducted each year, and improvement by selection is now being undertaken.

A plantation of Bananas introduced from the West Indies is a striking success, and a large number of suckers are distributed. A plantation of *Musa Cavendishii* has been recently formed.

Arrowroot, Ginger, Ground-nuts, Guinea-corn are also under cultivation.

Along two sides of the garden there are ornamental borders of indigenous plants, most of which are labelled with their scientific and native names.

There are also various specimens of indigenous economic trees, such as *Lophira alata*, *Anogiessus leiocarpus*, *Pterocarpus erinaceus*, *Strophanthus gratus*, &c.

The Herbarium, which has been formed during the last two years, now contains over 200 specimens correctly named, and should prove of great value.

Botanic Garden, Ebute-Metta.—When the new garden at Olokemeji was formed, it was proposed to abandon the garden at Ebute-Metta. Owing to its value, however, as a place of popular resort for the inhabitants of Lagos, it is now being maintained as a purely ornamental garden. The garden has an area of about three acres, and is under the charge of a native Assistant Curator.

Botanic Stations in the West Indies.—In the Reports for the year 1906–07, issued by the Imperial Commission of Agriculture for the West Indies, brief histories of the various Botanic stations have been given. The Reports, which give an interesting account

of the present condition of Botanical enterprise in the islands, are illustrated by some good photographs of the different gardens and of some of the more interesting plants grown therein.

The history of the Botanic Station at St. Lucia was reprinted in the last number (No. 3) of the *Kew Bulletin*, p. 142.

Dominica Botanic Station.—The history of this station is taken from the Reports for 1906–07.

"The Dominica Botanic Station was established on its present site in 1891. It is about 44 acres in area, and lies immediately at the back of the town of Roseau, about ½ mile from the landing place. It is on the right-hand side of the public road leading up to the Roseau Valley, and terminates near the first bridge over the Roseau River. Immediately above it, to the south-west, is the Morne, an elevated plateau about 500 ft. above the level of the sea. On the edge of the Morne, overlooking the station, are precipitous cliffs, and at the foot of these are easy slopes, suitable for cultivation. The land is undulating, with a rich sheltered hollow immediately under the Morne. In other places the soil is somewhat stony, and not so suitable for the growth of plants. There is, however, no part of the land not suitable for some cultivation or other. The site is well sheltered from prevailing winds to the south and east. On the northern side it is somewhat exposed. An abundant supply of water is available from the mains of the Roseau reservoir, which pass through the middle of the station.

"The objects in view in establishing this station were strictly experimental and economic. Ornamental plants were to be grown in moderate quantities for rendering the ground attractive and interesting, but chief attention was to be devoted to plants of an economic or industrial character, and especially those likely to be in demand for establishing new industries in Dominica. Again, the more the cultural operations of every kind were carried on as object-lessons for the instruction of the people, the better would the station fulfil its mission as a factor in the development of the resources of the island. A large number of very useful and interesting plants already existed in the island at St. Aroment, the property of Dr. H. A. A. Nicholls, C.M.G. These had been sent out from time to time from Kew, to the late Dr. Imray and Dr. Nicholls in exchange for Dominica plants kindly contributed at the private expense of these gentlemen. This collection was one of the best in the Leeward Islands.

"The first Curator was Mr. Charles Murray, from the Edinburgh Botanic Gardens, who was appointed September 9, 1889. He was soon after transferred to Grenada. Mr. Henry F. Green was appointed to succeed him, August, 1890. The work of laying out the ground of the present station was carried out by Mr. Green, and he also took a deep interest in forming the present successful plots of economic plants. Mr. Green resigned in February, 1892, to take charge of a private enterprise in the north of the island. Afterwards he became Superintendent of a Reformatory School at Roseau, until it was abolished in 1896. The next Curator was

Mr. Joseph Jones, who was trained at Kew. He arrived in the island in March, 1892. Mr. Jones immediately took up the duties of his office with energy and enthusiasm and he has proved an excellent Curator. It is stated in evidence that he has rendered 'services universally acknowledged by the planters of the island.' Mr. Jones has held this position up to the present time.

"The chief object of the garden has been to raise and distribute at moderate rates plants of an economic character and this work is steadily developing.

"In 1892, 17,000 plants were distributed, whilst in 1906–07 the number had risen to 83,000.

"Mr. G. F. Branch was appointed Agricultural Instructor in January 1900, and transferred to Grenada in July 1905, where he now holds a similar position. Since Mr. Branch left Dominica, the post of Agricultural Instructor has not been filled.

"On the establishment of the Agricultural School at Morne Bruce in December 1900, Mr. D. Tannock, who had been appointed from Kew to the Agricultural Department, Dominica, became Officer-in-charge. In April 1903, Mr. Tannock resigned to take up an appointment in New Zealand. He was succeeded by Mr. A. J. Brooks, who arrived from Kew in June 1903, to take up the duties of Officer-in-charge. He has continued in that capacity until the present time.

"Mr. Rudolph Penn was appointed schoolmaster at the Agricultural School in December 1900.

"In 1898, a foreman was appointed to the Botanic Station, and this post has been maintained continuously up to the present time."

Montserrat Botanic Station.—The following account of this station is taken from the Report for 1906–07.

"The work of the Imperial Department of Agriculture in Montserrat was begun by the appointment of the late Mr. A. J. Jordan, in 1899, as Agricultural Instructor, and the establishment, in 1901, of three Experiment Stations. These stations were situated at the Grove estate, at Harris' Village, and at Olveston respectively, and have been maintained from the time of their establishment up to the present. Grove Station, which is ½ a mile from the town of Plymouth, has been the headquarters of the Agricultural Instructor in Montserrat, and has combined with its work as an experiment station, the functions of a Botanic Station, while the Harris and Ovelston Stations have been maintained solely for the purpose of carrying out agricultural experiments.

"In 1899, Montserrat experienced a disastrous hurricane, owing to the effects of which, agricultural matters were in a very depressed condition at the time when the Imperial Department of Agriculture began its work in this island.

"During the two subsequent years, attention was particularly directed to aiding the peasants by means of the introduction of good varieties of yams, sweet potatoes, sugar-cane cuttings, and other food crops.

"In the meantime, experiments were carried on at the stations with these, and such other crops as seemed likely to give remunerative returns if grown on a commercial scale. In 1904, the title of the Officer-in-charge of the Experiment Station was changed from Agricultural Instructor to Curator.

"In 1905, Mr. Jordan was appointed Curator of the Botanical Gardens at Antigua, and Mr. W. Robson, the present Curator, was appointed to succeed Mr. Jordan at Montserrat. During the interval between the departure of Mr. Jordan and the arrival of Mr. Robson, the duties of the Curator were performed by Mr. E. Buckmire, foreman of the Botanic Gardens at St. Lucia. On June 1, 1900, Mr. Dudley Johnson was appointed Local Instructor, which post he has retained up to the present time."

St. Kitt's-Nevis Botanic Station.—The history of this station is taken from the Reports for 1906-07 on the Botanic Station, &c., for St. Kitt's-Nevis.

"The Botanic Station in St. Kitt's was established in the latter part of 1899. The first Curator, Mr. Charles Plumb, was appointed in October of that year.

"The site of the present station was selected by Mr. (now Sir) Daniel Morris, Assistant Director, Royal Gardens, Kew, towards the end of 1890, when he was in the West Indies on an official visit in connexion with the Botanic Stations. The land so selected originally formed part of a sugar estate, La Guerite, which had been purchased by the local Government.

"The station was laid out by Mr. Plumb during the years 1891 and 1892 according to the plan laid down by Mr. Morris, and considerable time and money were spent in making roads and planting wind-belts of trees to protect the station from the effects of the sea blast and high winds.

"Mr. Plumb continued in charge of the station under the supervision of Mr. C. A. Barber, the then Superintendent of Agriculture for the Leeward Islands, until March 1, 1893, when he resigned, and Mr. Wade was appointed in his place.

"On the abolition of Mr. Barber's office, Mr. Wade continued in charge until October, 1898, when Mr. W. Lunt, who had been trained at Kew, and who had been for some years at the Royal Botanic Gardens, Trinidad, was appointed Curator, with Mr. Wade as foreman.

"Mr. Lunt died on January 3, 1904, and the present Curator, Mr. F. R. Shepherd, who was then Superintendent of Skerretts Training School at Antigua, was appointed to act as Curator for one year, and at the end of that time was confirmed in the appointment."

Tortola Experiment Station.—The history of the station is taken from the Report on the Experiment Station, Tortola, Virgin Islands, for 1906-07.

"The Imperial Department of Agriculture began its work in the Virgin Islands in 1900. A partly abandoned sugar estate to the north-west of Road Town was chosen as the site for an

Experiment Station and was purchased from the funds of the Imperial Grant-in-aid. This estate consisted of about 160 acres of land, nearly one-half of which is a steep hillside. At the time of its purchase, the old sugar works had fallen into a state of disrepair and the sugar mill was practically useless.

"Mr. C. W. Seale was appointed Agricultural Instructor in charge of the Experiment Station. Under his direction a house was built for the use of the Agricultural Instructor; necessary roads were laid out, and model plots were established which were planted up in limes, seedling canes, cacao, coffee, fruit trees, &c. In 1902, Mr. W. C. Fishlock was appointed Agricultural Instructor, and he has held that post up to the present time.

"A well has been sunk and an aermotor erected for pumping water. This ensures a permanent and regular water supply to the Experiment Station. A small Chatanooga mill has been purchased and established in the old sugar works. The sugar battery has been entirely rebuilt and the buildings have been put in a fair state of repair. More recently a building has been erected to serve as a cotton factory, and suitable machinery for ginning and baling the cotton has been placed in it.

"On taking over the property the Department let out about 46 acres to twenty-four tenants on the part-payment system, the tenants binding themselves to plant certain crops, and the Department agreeing to put them in full possession of their plots at the end of seven years. This agreement commenced in 1902, and, it must be confessed, does not seem likely to end satisfactorily.

"The land reserved for the station proper, about 14 acres, was laid off in plots of 1 acre and planted with various crops. One plot was planted with limes, a second with seedling canes, a third with various fruit trees, a fourth with pine-apples, a fifth with cacao, and a sixth with coffee, and so on.

"These crops have mostly been successful and have served to indicate what crops may be grown in Tortola. As regards outside work, it may be mentioned that a woolless breed of sheep which is well suited to the place has been introduced. A young Toggenburg goat was also imported with a view of improving the local breed of goats."

Cacao Pests of Trinidad.—In the *Proceedings of the Agricultural Society of Trinidad* for December, 1907, an interesting and useful paper is given on the Cacao pests of the Island, with notes upon miscellaneous crops, by Mr. O. W. Barrett, of the United States Department of Agriculture. The article has been re-issued as a separate "Society Paper," No. 280.

Both fungal and insect pests are dealt with, the most important of the former being a species of *Lasiodiplodia*, a genus of *Sphaeropsidaceae*. Spore dispersion and remedies are discussed, but the only remedy against the fungus appears to be the destruction of the diseased tissues.

The importance of "Cover Crops" to prevent cracking of the soil and consequent loss of water is also dealt with, and leguminous plants of the genera *Desmodium*, *Cassia*, *Mucuna*, *Vigna*, *Crotalaria* and *Sesbania* are recommended for this purpose, since

they also tend to enrich the soil with nitrogen. Under the heading "Shade" it is suggested that young plants require some protection to prevent the roots becoming dry, but that, as far as the effect of direct sunlight on the leaves is concerned, shade does not appear to be advantageous. The planting of the Immortelle (*Erythrina umbrosa*) as a shade tree is considered to be harmful rather than beneficial to the Cacao trees.

Pruning, picking, spraying and fertilizers form the subject of short paragraphs, and some notes on the pests of other crops, such as Sugar Cane, Bananas and Cocoanuts, are also given.

The article concludes with the following summary :—

"Placing the value of the normal cacao crop of Trinidad at $10,000,000·00 net per annum under existing erroneous agronomic methods and the common malpractices of culture, it is estimated that between $3,000,000·00 and $5,000,000·00 value of pods are lost through fungus attack, of which at least 30, if not 50 per cent. could be saved with proper attention only to the methods of preventing fungus infection.

"It is also estimated that the present normal yield of cacao could be readily more than doubled by the application of fertilizers, proper tillage of the soil, and the substitution of leguminous cover crops for the shade trees now employed.

"Probably 80 per cent. of the loss of pods and woody tissue is caused by a species of fungus belonging to the genus *Lasiodiplodia*, though there are several other fungi which cause various rots of the fruit and cankers of the stem and branches.

"The direct loss from insects is comparatively slight, though there are numerous ecological problems along this line which require investigation.

"The weather—aside from the wind movement and prolonged drought—has comparatively little direct effect upon the growth or fruiting of the cacao itself, though it may largely influence the action of parasitic fungi. The average cacao tree on the ordinary plantation in Trinidad and Tobago is severely suffering from fungus attacks and from lack of sunlight and soil nourishment; under favourable conditions it should produce from two to three times its present yield."

Mud-binding Grasses.—In the *Journal of the Board of Agriculture of British Guiana*, Vol. I., No. 3, 1908, appears an article on the use of "Wild Rice," *Spartina brasiliensis*, Raddi., as a resistant to coast erosion. The Courida, *Avicennia nitida*, Jacq., is the commonest tree fringing the Coast in British Guiana and the Black and White Mangroves (*Rhizophora Mangle*, Linn., and *Laguncularia racemosa*, Gaertn.) also occur in quantity. They grow in the soft mud, and at every high tide their roots are covered by the sea. The Mangrove, however, on account of its wide-spread roots, was considered better than the Courida in protecting the foreshore. Recently the discovery of the value of the "Wild Rice" for accumulating mud has led to a development of the systematic planting of this grass, which has proved to be successful. The grass has been planted in rows about six feet apart, each plant

being about two feet from the next, and the plants are put in about one foot below the surface. When the grass has become firmly established Mangrove seedlings have been planted amongst it, and these appear to have flourished without any further trouble. As the Mangroves grow they form so thick a shade that the grass dies out, but by this time the Mangroves are now large enough to prevent coast erosion without the aid of the *Spartina*. The value of the "Wild Rice" grass then is due to the fact that it appears to be the only plant which is able to establish itself in the soft shifting mud on the seaward side of the fringe of Courida or Mangrove, and in this position it accumulates mud on which it is possible for the Mangrove to become established.

New Garden Plants of the Year 1907.—Appendix III. of the *Kew Bulletin* for the current year, consisting of a list of plants new to cultivation or of noteworthy plants reintroduced in 1907, has been drawn up by Mr. Skan as in former years, and is now published.

Raffia fibre from Madagascar.—The fibre is derived from the petiole of a species of *Raphia*. It agrees so closely in microscopic structure with a sample of fibre from the petiole of *Raphia pedunculata*, Beauv., in the museum at Kew, that there can be little doubt that this is the species concerned.

A single fibre, when complete, consists of a vascular bundle enclosed in a fibrous sheath. In a transverse section of the whole, the fibrous sheath, which is five or six cells in thickness, is seen to be slightly interrupted at two points. The vascular bundle includes one group of wood-vessels, and two masses of soft bast, arranged as in several other Palms. A striking feature is the large amount of soft parenchymatous tissue lying between the fibrous sheath and the woody part of the vascular bundle.

The structure of the petiole of another species of *Raphia* (*R. vinifera*, Beauv., var. *taedigera*) was examined by way of comparison. Here vascular bundles of a similar type, each with its fibrous sheath, are scattered over the cross-section, being embedded in soft parenchymatous tissue, in which there are a certain number of much smaller bundles.

The fibres are somewhat laterally compressed, being roughly oval in cross-section, and show two external longitudinal grooves corresponding to the interruptions in the fibrous sheath. The external surface is generally clean, but, here and there, portions of the adjacent soft tissue (belonging to the petiole) remain adhering to it. The greater diameter of the fibres in the sample varied from 1 to 1·5 mm., and one specimen measured nearly seven feet in length. As the fibrous sheath is comparatively thin, and as there is a large amount of soft tissue within it, the fibre may easily be crushed flat, and hence resembles a straw. In this it differs from the fibres in the lower part of the petiole of different species of *Raphia*. These have a much thicker fibrous sheath, which encloses much less soft tissue with the vascular bundle. They are consequently quite hard and stiff, and, under the name of 'bass' or 'piassaba' fibre, are used for making brooms in the same way as the corresponding fibres of other genera of Palms.

The fibre appears to be identical with that described and figured by Perrot and Goris (Recherches sur les pailles à chapeaux de Madagascar, in L'Agriculture pratique des pays chauds, 7 Année, No. 57, Dec. 1907, p. 484, Pl. XIII.) under the native name of "Ahipotsy" or "Hahipotsy." The authors remark: "La structure anormale de cette paille ne nous permet pas de la rapporter à une plante ou un groupe de plantes déjà connu," and add: "Cette paille doit cependant arriver dans le commerce, car elle nous fut envoyée d'Italie pour être identifiée."

Perrot and Goris speak of the fibres as "petites tigelles," and refer to the superficial cells as "cellules épidermiques." They thus appear to have regarded the fibres as representing the entire stem of some plant, and it is, no doubt, for this reason that they found the structure so abnormal. They give good illustrations of the microscopic structure (l.c., Pl. XIII), but the apparent cavity near the centre of the bundle, described by them as a "large lacune," is really a pitted wood-vessel.

L.A.B.

French West Africa.—Under the direction of the General Government of French West Africa a series of very useful and interesting publications have appeared dealing with agricultural matters. In 1906, a brochure on Cotton by M. Yves Henry, Director of Agriculture, was published consisting of 346 pages and illustrated by excellent maps, photographs and drawings. In the same year M. Yves Henry published a similar treatise on Rubber in which a history of the Rubber industry in the five French colonies is given, together with the rules laid down in connection with the industry in 1905 and the results obtained in the year 1905–06. A series of excellent photographs and a map are included in the volume.

The agriculture of Dahomey forms the subject of a volume of 110 pages by M. N. Savariau, Chief of the Agricultural Service, in which among other things an account of the Oil Palm industry is given with some excellent photographs of the palms and of the method of preparation of the oil by the natives. At the end of the volume there is a clear agricultural map of the country.

Under the title 'L'Élevage,' M. C. Pierre, Chief of the Zootechnical Service, treats of the animals used in West Africa, and gives a very useful account of the principal fodder plants of the region.

These four volumes were published on the occasion of the National Colonial Exhibition at Marseilles.

They have been followed by an account of the Cotton industry in French West Africa in 1906, published by M. Yves Henry in 1907, and by a volume entitled 'L'Arachide,' published this year by M. Jean Adam, Inspector of Agriculture, dealing with the origin, geographical area, varieties, culture, products, &c., of *Arachis hypogaea*. As in the case of the other volumes, there are very useful maps and interesting illustrations.

The volumes are issued by M. Challamel, of the Maritime and Colonial Library, Paris.